

The ground water analytical data in the CR 126 West Area for the S1 sand indicates elevated levels of benzene, toluene, vinyl chloride, 1,2-dichloroethane, trans-1,2-dichloroethene, cis-1,2-dichloroethene, 1,2-dichloropropane, 1,1,2-trichloroethane, trichloroethene, 1,1-dichloroethene and styrene at or above their MCLs. These samples were collected from monitor wells in about a 3-acre area centered near well AW-56. Elevated levels (above 1 mg/L) of 1,1-dichloroethane, acetone, tert-butyl alcohol, naphthalene, 2-butanone, and 2-hexanone have also been reported. The horizontal extent of affected ground water in the shallow zone (i.e., the S1 Sand) is defined by non-detected results at well locations to the north [Temporary Monitoring Well (TMW) 17, TMW-18, TMW-13, and TMW-15], to the east (MW-31), to the south (AW-64 and AW-47), and to the west (AW-41, and MW-30) (See Figure 27). A summary of the S1 ground water analytical results is provided in Table 6.

The ground water results from the S2 Sand indicate elevated levels of benzene, vinyl chloride, and 1,2-dichloroethane at or above their MCLs. The data suggests that the releases that affected the S1 sands have also affected the deeper S2 sand. A review of the results for the samples shows that contaminant concentrations within the S2 Sand decrease rapidly with depth. However, affected ground water extends to the base of the S2 Sand (approximately 80 feet below ground surface). The affected ground water plume extends laterally to the west-southwest from the source area to well MW-127.

Concentrations of site contaminants detected in MW-127 are below the MCLs. Data collected from S2 wells MW-122 and MW-123 (located north and south of the source area) were used to estimate the limit of the S2 contaminated ground water plume (See Figure 28). A summary of S2 ground water analytical results is provided in Tables 7 - 8.

The qualitative MIP screening and soil and groundwater sampling were used to assess the extent of contaminated soil and groundwater in order to evaluate remedial alternatives and support remedial design activities. Data collected from this effort was used to develop an estimate of the contaminant distribution within the soils and ground water in the CR 126 West Area. This estimate is presented in the Table 9.

The area of contaminated S1 shallow ground water is approximately 3 acres (See Figure 29). The saturated zone currently extends within ten feet of the ground surface, but was as deep as 18 feet in the past based on historical data; this has resulted in a smear zone for the capillary fringe.

Data from the various investigations in the CR 126 West Area indicate that limited migration of the organic contaminants has occurred, which suggests that the organics present have an affinity for the soil. There does not appear to have been a significant amount of migration in the S1 or S2 sands from the CR 126 West Area in the last 30 years since disposal occurred. For example, benzene and vinyl chloride concentration levels reported in analytical results for ground water samples collected in February 2005 from monitor well AW-62 (7.5 and 78 mg/L, respectively) are greatly reduced by the time the ground water has migrated only a short distance to well AW-63 (0.0007 and 0.012 mg/L, respectively), located about 50 feet directly down gradient.

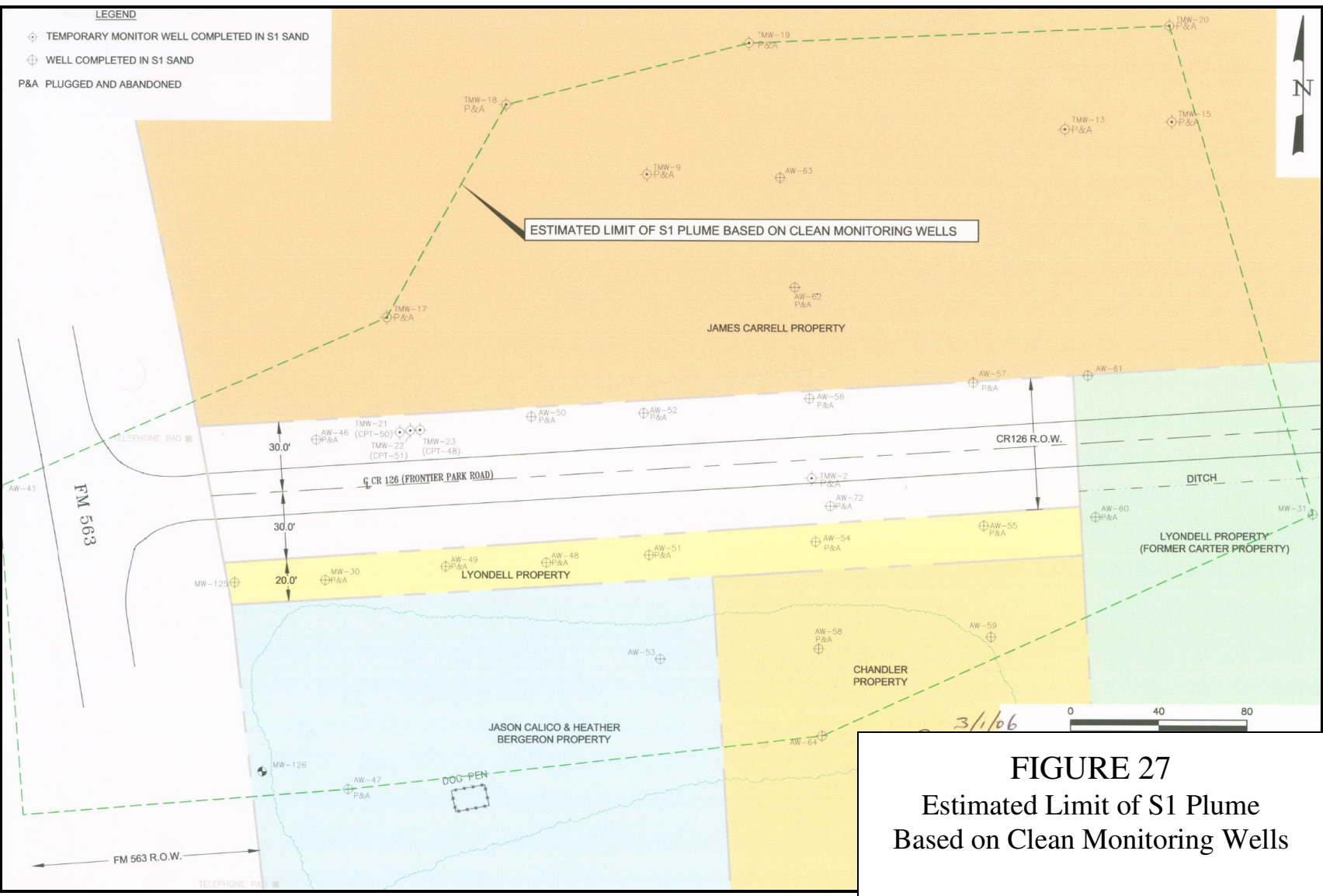


FIGURE 28
Estimated Limit of S2 Plume
Based on Clean Monitoring Wells

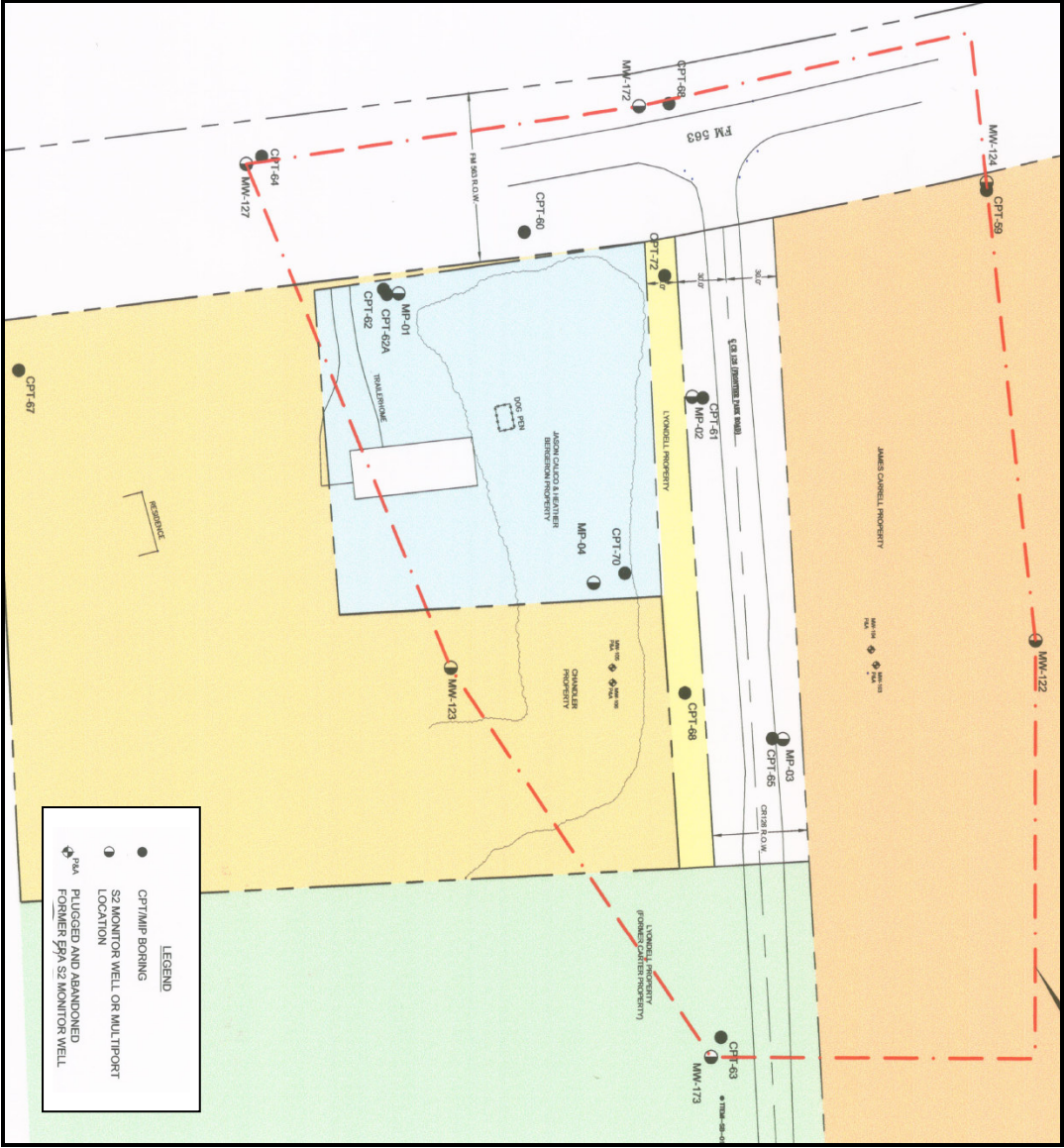


Table 6
Summary of Recent S1 Ground Water Analytical

	Sample ID:	AW-41	AW-46	AW-47	AW-48	AW-49	AW-50	AW-51	AW-52	AW-53	AW-54	AW-55	AW-56
Constituent	Date:	2/1/2005	2/1/2005	2/2/2005	2/18/2005	2/18/2005	2/2/2005	2/18/2005	2/2/2005	2/2/2005	2/18/2005	2/18/2005	2/3/2005
Chloromethane	mg/L	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.01	<0.001	<0.001	<1	<0.05	<0.2
Vinyl Chloride	mg/L	<0.001	0.013	0.001(J)	3	0.036	0.078	7	5	0.005	39	10	39
Chloroethane	mg/L	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.01	<0.001	<0.001	<1	<0.05	<0.2
1,1-Dichloroethene	mg/L	<0.0008	<0.0008	<0.0008	<0.004	<0.0008	<0.0008	<0.008	<0.0008	<0.0008	<0.8	<0.04	<0.16
Methylene Chloride	mg/L	<0.002	<0.002	<0.002	<0.01	<0.002	<0.002	<0.02	<0.002	<0.002	<2	<0.1	<0.4
trans-1,2-Dichloroethene	mg/L	<0.0008	<0.0008	<0.0008	0.016(J)	<0.0008	0.001(J)	0.059	0.039	<0.0008	5.5	0.32	2.2
1,1-Dichloroethane	mg/L	<0.001	0.022	<0.001	1.1	0.011	0.049	2.8	0.77	0.12	430	9.9	150
cis-1,2-Dichloroethene	mg/L	<0.0008	<0.0008	<0.0008	<0.004	<0.0008	0.002(J)	<0.008	0.005(J)	<0.0008	<0.8	<0.04	0.24(J)
Chloroform	mg/L	<0.0008	<0.0008	<0.0008	<0.004	<0.0008	<0.0008	<0.008	0.008	<0.0008	<0.8	<0.04	<0.16
Benzene	mg/L	<0.0005	<0.0005	<0.0005	0.007(J)	<0.0005	0.002(J)	0.044(J)	1.1	<0.0005	8.8	0.18(J)	9
1,2-Dichloroethane	mg/L	<0.001	<0.001	<0.001	<0.005	<0.001	0.006	<0.01	0.073	<0.001	22	<0.05	7.2
Trichloroethene	mg/L	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.01	0.002(J)	<0.001	<1	<0.05	<0.2
1,2-Dichloropropane	mg/L	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.01	0.001(J)	<0.001	<1	<0.05	<0.2
Toluene	mg/L	<0.0007	<0.0007	<0.0007	<0.004	<0.0007	<0.0007	<0.007	0.027	<0.0007	<0.7	<0.035	1.8
1,1,2-Trichloroethane	mg/L	<0.0008	<0.0008	<0.0008	<0.004	<0.0008	<0.0008	<0.008	0.001(J)	<0.0008	<0.8	<0.04	<0.16
Chlorobenzene	mg/L	<0.0008	<0.0008	<0.0008	<0.004	<0.0008	<0.0008	<0.008	<0.0008	<0.0008	<0.8	<0.04	<0.16
Ethylbenzene	mg/L	<0.0008	<0.0008	<0.0008	<0.004	<0.0008	<0.0008	<0.008	<0.0008	<0.0008	<0.8	<0.04	0.17(J)
Styrene	mg/L	R	R	<0.001	<0.005	R	<0.001	<0.01	<0.001	<0.001	<1	<0.05	<0.2
t-Butyl alcohol	mg/L	<0.01	1.2	<0.01	<0.05	<0.01	15	<0.1	8.6	<0.01	<10	<0.5	9.1(J)
Acetone	mg/L	R	R	R	R	R	R	R	R	R	64(J)	R	R
Carbon Disulfide	mg/L	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.01	<0.001	<0.001	<1	<0.05	<0.2
2-Butanone	mg/L	<0.003	<0.003	<0.003	R	R	<0.003	R	<0.003	<0.003	R	R	<0.6
cis-1,3-Dichloropropene	mg/L	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.01	<0.001	<0.001	<1	<0.05	<0.2
2-Hexanone	mg/L	<0.003	<0.003	<0.003	<0.015	<0.003	<0.003	<0.03	<0.003	<0.003	<3	<0.15	<0.6
Xylene (Total)	mg/L	<0.0008	<0.0008	<0.0008	<0.004	<0.0008	<0.0008	<0.008	0.012	<0.0008	<0.8	<0.04	<0.16

NOTES:

D = Duplicate Sample

J = Estimated Concentration

R = Rejected

<0.002 = Not Detected at the given laboratory limit

Table 6 (Continued)
Summary of Recent S1 Ground Water Analytical Results

Constituent	Sample ID: Date:	AW-57 2/3/2005	AW-58 2/3/2005	AW-59 2/3/2005	AW-60 2/18/2005	AW-61 2/3/2005	AW-62 2/2/2005 2/17/2005		AW-63 2/1/2005 2/17/2005 3/30/2005			DUP-033005 (AW-63) 3/30/2005	AW-64 2/3/2005
Chloromethane	mg/L	<0.05	<0.002	<0.001	<0.005	<0.001	<0.005	<0.02	<0.001	<0.001	<0.001	<0.001	<0.001
Vinyl Chloride	mg/L	33	1.5	0.001(J)	1.9	0.79	25	78	<0.001	0.012	<0.001	<0.001	<0.001
Chloroethane	mg/L	<0.05	0.011	<0.001	<0.005	<0.001	<0.005	<0.02	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethene	mg/L	0.045(J)	<0.002	0.001(J)	0.005(J)	0.002(J)	<0.004	0.11	<0.0008	<0.0008	<0.0008	<0.0008	0.003(J)
Methylene Chloride	mg/L	<0.1	<0.004	<0.002	<0.01	<0.002	<0.01	<0.04	<0.002	<0.002	<0.002	<0.002	<0.002
trans-1,2-Dichloroethene	mg/L	1.1	0.55	0.008	0.011(J)	0.002(J)	1.4	3.7	<0.0008	0.0009(J)	<0.0008	<0.0008	<0.0008
1,1-Dichloroethane	mg/L	42	65	0.94	0.39	0.042	76	230	<0.001	0.03	0.025	0.028	0.7
cis-1,2-Dichloroethene	mg/L	0.058(J)	0.087	<0.0008	<0.004	0.001(J)	0.12	0.32	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Chloroform	mg/L	0.057(J)	<0.002	<0.0008	<0.004	0.003(J)	0.018(J)	0.05(J)	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Benzene	mg/L	4.6	1.1	<0.0005	0.006(J)	0.062	2.9	7.5	<0.0005	0.0007(J)	<0.0005	<0.0005	<0.0005
1,2-Dichloroethane	mg/L	0.7	2.8	<0.001	<0.005	0.004(J)	2.1	6	<0.001	<0.001	<0.001	<0.001	0.003(J)
Trichloroethene	mg/L	<0.05	0.005(J)	<0.001	<0.005	<0.001	0.005(J)	<0.02	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichloropropane	mg/L	<0.05	0.12	<0.001	<0.005	<0.001	0.059	0.15	<0.001	<0.001	<0.001	<0.001	<0.001
Toluene	mg/L	0.79	0.18	<0.0007	<0.004	<0.0007	0.52	1.2	<0.0007	<0.0007	<0.0007	<0.0007	<0.0007
1,1,2-Trichloroethane	mg/L	<0.04	0.045	<0.0008	<0.004	<0.0008	0.016(J)	0.038(J)	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Chlorobenzene	mg/L	<0.04	0.095	<0.0008	<0.004	<0.0008	0.025(J)	0.058(J)	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Ethylbenzene	mg/L	<0.04	0.018	<0.0008	<0.004	<0.0008	0.03	0.065(J)	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Styrene	mg/L	<0.05	<0.002	<0.001	<0.005	<0.001	0.027	0.063(J)	<0.001	<0.001	<0.001	<0.001	<0.001
t-Butyl alcohol	mg/L	1.3(J)	0.45	<0.01	<0.05	0.18	0.97	2.2	<0.01	<0.01	<0.01	<0.01	<0.01
Acetone	mg/L	R	R	R	R	R	3.5(J)	18(J)	R	R	R	R	R
Carbon Disulfide	mg/L	<0.05	<0.002	<0.001	<0.005	<0.001	<0.005	<0.02	<0.001	<0.001	<0.001	<0.001	<0.001
2-Butanone	mg/L	<0.15	0.006(J)	<0.003	R	<0.003	0.099	0.37(J)	<0.003	R	<0.003	<0.003	<0.003
cis-1,3-Dichloropropene	mg/L	<0.05	<0.002	<0.001	<0.005	<0.001	<0.005	<0.02	<0.001	<0.001	<0.001	<0.001	<0.001
2-Hexanone	mg/L	<0.15	<0.006	<0.003	<0.015	<0.003	<0.015	<0.06	<0.003	<0.003	<0.003	<0.003	<0.003
Xylene (Total)	mg/L	0.19(J)	0.058	<0.0008	<0.004	<0.0008	0.062	0.14	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008

NOTES:

D = Duplicate Sample

J = Estimated Concentration

R = Rejected

<0.002 = Not Detected at the given laboratory limit

Table 6 (Continued)
Summary of Recent S1 Ground Water Analytical Results

Constituent	Sample ID:	AW-72	DUP021805	MW-30	MW-31	MW-32	MW-125	MW-126	TMW-9		TMW-13	
	Date:	2/3/2005	2/18/2005	2/17/2005	2/18/2005	2/18/2005	6/1/2005	6/1/2005	2/18/2005	3/30/2005	2/18/2005	3/30/2005
Chloromethane	mg/L	<0.005	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vinyl Chloride	mg/L	5.9	1.6	<0.001	<0.001	<0.001	<0.001	<0.001	0.026	0.013	<0.001	<0.001
Chloroethane	mg/L	0.49	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001(J)	<0.001	<0.001
1,1-Dichloroethene	mg/L	0.007(J)	<0.008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Methylene Chloride	mg/L	<0.01	<0.02	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
trans-1,2-Dichloroethene	mg/L	0.57	0.009(J)	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	0.0008(J)	<0.0008	<0.0008	<0.0008
1,1-Dichloroethane	mg/L	31	0.36	0.002(J)	0.002(J)	<0.001	<0.001	<0.001	0.036	0.031	<0.001	<0.001
cis-1,2-Dichloroethene	mg/L	0.036	<0.008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Chloroform	mg/L	0.046	<0.008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	0.001(J)	<0.0008
Benzene	mg/L	3.3	0.005(J)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.001(J)	<0.0005	0.002(J)	<0.0005
1,2-Dichloroethane	mg/L	1.3	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trichloroethene	mg/L	<0.005	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.012	0.002(J)
1,2-Dichloropropane	mg/L	0.018(J)	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Toluene	mg/L	1.1	<0.007	<0.0007	<0.0007	<0.0007	<0.0007	<0.0007	0.017	0.004(J)	0.85	<0.0007
1,1,2-Trichloroethane	mg/L	0.006(J)	<0.008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Chlorobenzene	mg/L	<0.004	<0.008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Ethylbenzene	mg/L	0.18	<0.008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Styrene	mg/L	0.008(J)	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
t-Butyl alcohol	mg/L	4.3	<0.1	7.7	<0.01	<0.01	<0.01	<0.01	0.016(J)	0.021(J)	<0.01	<0.01
Acetone	mg/L	0.17(J)	R	R	R	R	<0.006	<0.006	0.02(J)	0.1(J)	0.009(J)	R
Carbon Disulfide	mg/L	<0.005	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2-Butanone	mg/L	0.041(J)	R	R	R	R	<0.003	<0.003	R	<0.003	R	<0.003
cis-1,3-Dichloropropene	mg/L	<0.005	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2-Hexanone	mg/L	<0.015	<0.03	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Xylene (Total)	mg/L	0.13	<0.008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008

NOTES:

D = Duplicate Sample

J = Estimated Concentration

R = Rejected

<0.002 = Not Detected at the given laboratory limit

Table 6 (Continued)
Summary of Recent S1 Ground Water Analytical Results

Constituent	Sample ID: Date:	TMW-15		TMW-17		TMW-18		TMW-20
		2/18/2005	3/30/2005	2/18/2005	3/30/2005	3/30/2005	3/30/2005	3/30/2005
Chloromethane	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vinyl Chloride	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chloroethane	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethene	mg/L	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Methylene Chloride	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
trans-1,2-Dichloroethene	mg/L	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
1,1-Dichloroethane	mg/L	<0.001	<0.001	<0.001	0.004(J)	<0.001	<0.001	<0.001
cis-1,2-Dichloroethene	mg/L	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Chloroform	mg/L	<0.0008	<0.0008	0.002(J)	0.001(J)	<0.0008	<0.0008	<0.0008
Benzene	mg/L	0.0006(J)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
1,2-Dichloroethane	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trichloroethene	mg/L	0.005(J)	0.003(J)	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichloropropane	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Toluene	mg/L	0.26	0.019	0.029	<0.0007	<0.0007	<0.0007	<0.0007
1,1,2-Trichloroethane	mg/L	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Chlorobenzene	mg/L	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Ethylbenzene	mg/L	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Styrene	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
t-Butyl alcohol	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acetone	mg/L	R	R	0.008(J)	1.9(J)	R	R	R
Carbon Disulfide	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2-Butanone	mg/L	R	<0.003	R	<0.003	<0.003	<0.003	<0.003
cis-1,3-Dichloropropene	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2-Hexanone	mg/L	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Xylene (Total)	mg/L	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008

NOTES:

D = Duplicate Sample

J = Estimated Concentration

R = Rejected

<0.002 = Not Detected at the given laboratory limit

Table 7
Summary of Recent S2 Discrete Ground Water Analytical Results

Constituent	Lab ID: Sample ID: Date:	4539185	4539186	4539187	4539180	4539181	4539182	4539173	4539174	4539175	4539176
		CPT-61 40'	CPT-61 60'	CPT-61 80'	CPT-62 40'	CPT-62 60'	CPT-62 80'	CPT-65 40'	Duplicate	CPT-65 60'	CPT-65 80'
		6/7/2005	6/7/2005	6/7/2005	6/7/2005	6/7/2005	6/7/2005	6/6/2005	6/6/2005	6/6/2005	6/6/2005
Chloromethane	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vinyl Chloride	mg/L	2	<0.001	<0.001	<0.001	<0.001	<0.001	0.27	0.27	0.005(U)	0.003(U)
Chloroethane	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethene	mg/L	0.003(J)	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Methylene Chloride	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
trans-1,2-Dichloroethene	mg/L	0.006	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	0.011	0.011	<0.0008	<0.0008
1,1-Dichloroethane	mg/L	0.048	<0.001	<0.001	<0.001	<0.001	<0.001	0.33	0.33	0.031	0.008
cis-1,2-Dichloroethene	mg/L	0.001(J)	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Chloroform	mg/L	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Benzene	mg/L	0.072	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.021	0.022	0.002(J)	0.001(J)
1,2-Dichloroethane	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.010	0.011	<0.001	<0.001
Trichloroethene	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichloropropane	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Toluene	mg/L	<0.0007	<0.0007	<0.0007	<0.0007	<0.0007	<0.0007	0.002(U)	0.002(U)	0.0008(U)	<0.0007
1,1,2-Trichloroethane	mg/L	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	NA	<0.0008	<0.0008	<0.0008
Chlorobenzene	mg/L	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Ethylbenzene	mg/L	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Styrene	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
t-Butyl alcohol	mg/L	0.086(U)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acetone	mg/L	R	R	R	R	R	R	R	R	R	R
Carbon Disulfide	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2-Butanone	mg/L	R	<0.003	R	R	R	R	R	R	R	R
cis-1,3-Dichloropropene	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2-Hexanone	mg/L	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Xylene (Total)	mg/L	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	0.0008	<0.0008	<0.0008	<0.0008

NOTES:

J = Estimated Concentration

<0.002 = Not Detected at the given laboratory limit

R = Rejected

Table 8
Summary of Recent S2 Ground Water Analytical Results

Constituent	Sample ID: Date:	MW-103	DUP-2 (MW-103)	MW-103	MW-104	MW-104	MW-105	MW-106	MW-124	MW-127
		2/2/2005	2/2/2005	2/17/2005	2/1/2005	2/17/2005	2/2/2005	2/2/2005	6/2/2005	6/7/2005
Chloromethane	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vinyl Chloride	mg/L	0.006	0.005(J)	<0.001	<0.001	0.002(J)	0.05	<0.001	<0.001	<0.001
Chloroethane	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethene	mg/L	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	0.002(J)	<0.0008	<0.0008	<0.0008
Methylene Chloride	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
trans-1,2-Dichloroethene	mg/L	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	0.035	<0.0008	<0.0008	<0.0008
1,1-Dichloroethane	mg/L	0.017	0.017	0.002	<0.001	0.016	5.8	0.008	<0.001	<0.001
cis-1,2-Dichloroethene	mg/L	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	0.003(J)	<0.0008	<0.0008	<0.0008
Chloroform	mg/L	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	0.005(J)	0.003(J)
Benzene	mg/L	0.001(J)	0.001(J)	<0.0005	<0.0005	0.0008(J)	0.013	<0.0005	<0.0005	<0.0005
1,2-Dichloroethane	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	0.006	<0.001	<0.001	<0.001
Trichloroethene	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichloropropane	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	0.014	<0.001	<0.001	<0.001
Toluene	mg/L	0.0008(J)	0.0008(J)	<0.0007	<0.0007	<0.0007	0.005	<0.0007	<0.0007	<0.0007
1,1,2-Trichloroethane	mg/L	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	0.005(J)	<0.0008	<0.0008	<0.0008
Chlorobenzene	mg/L	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	0.002(J)	<0.0008	<0.0008	<0.0008
Ethylbenzene	mg/L	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Styrene	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
t-Butyl alcohol	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.024(U)
Acetone	mg/L	R	R	R	R	R	R	R	<0.006	R
Carbon Disulfide	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2-Butanone	mg/L	<0.003	<0.003	R	<0.003	R	<0.003	<0.003	<0.003	R
cis-1,3-Dichloropropene	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2-Hexanone	mg/L	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Xylene (Total)	mg/L	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008

NOTES:

J = Estimated Concentration

R = Rejected

<0.002 = Not Detected at the given laboratory limit

TABLE 9
CR 126 WEST AREA
CONTAMINANT DISTRIBUTION IN SOIL AND GROUND WATER

Zone	Depth Below Ground Surface (feet)	Contaminant Mass in Place (kg)	Percent of Total
C1 Clay Zone	0 to 10	779	9.97%
C1 Capillary Fringe	10 to 18	2506	31.47%
Shallow Saturated Zone (S1)	18 to 24	2929	36.79%
Ground Water (S1)	~20 to 22½	57	---
Below Shallow Zone (C2)	24 to ~30	1733	21.77%
Intermediate/Deeper Zones	30 to 80	14	0.18%
Ground Water	30 to 80	18	---

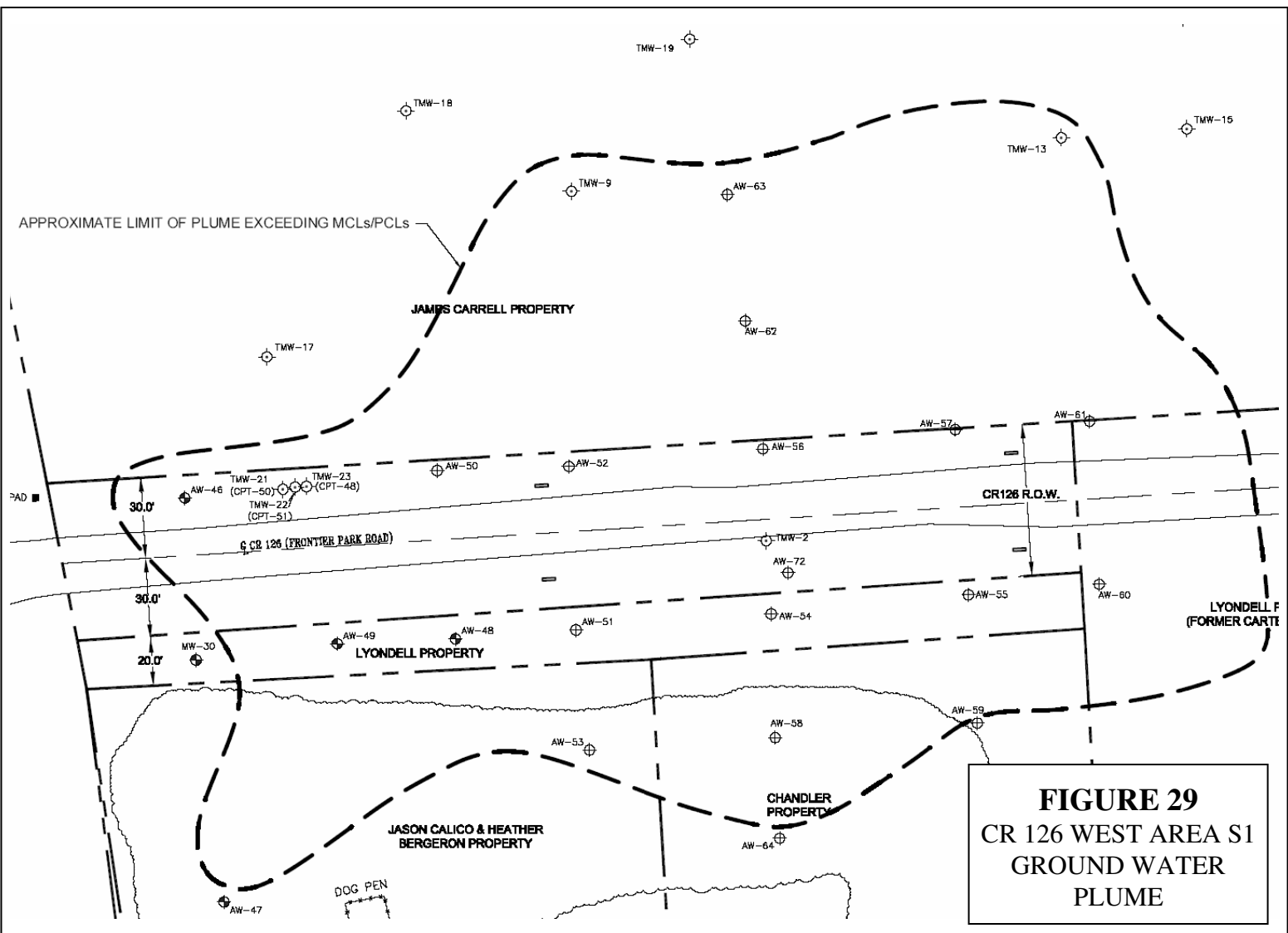
Note: Percent of total calculated on soil analytical data only.

Natural attenuation is likely occurring in the CR 126 West Area and appears to be controlling the migration of constituents and likely accounts for the relatively low levels and limited extent of contaminants reported in the monitoring wells. A chemical fate and transport discussion for reported contaminants is discussed in Section 5.0 of the *Supplemental Site Investigation and Alternative Evaluation Report* (Environmental Resources Management, December 2, 2005). The type of chemical and amount released into an environmental medium via a specific pathway is largely dependent on physical and chemical properties of the contaminant as well as site-specific factors.

3.3 CR 126 West Area Remedy

The Supplemental Site Investigation and Alternative Evaluation Report (SSI-AER) included various remedial technologies, grouped the technologies into various remedial alternatives, and evaluated the remedial alternatives for applicability to the CR 126 West Area. The SSI-AER presented and evaluated eight different remedial alternatives, including:

1. No Action;
2. Institutional Action;
3. Natural Attenuation;
4. Pump and Treat;
5. Excavation;
6. In-situ Chemical Oxidation (ISCO);
7. Soil vapor extraction (SVE); and
8. A Combination Alternative of Excavation and ISCO.



The results of the evaluation of the eight remedial alternatives concluded that none of the alternatives would meet the remedial objective of achieving MCLs in ground water at the CR 126 West Area within a reasonable time frame. In particular, of the above remedial alternatives, the No Action, the Institutional Action, and the Natural Attenuation alternatives are not acceptable because they entail no source reduction and no active treatment. For the other alternatives, by considering the estimated mass to be present, subtracting the amount of mass potentially removed or treated by the above technologies, and then dividing by the natural attenuation rates in the CR 126 West Area, provides estimates of cleanup times that are greater than 100 years. However, each alternative would be protective of public health and the environment if they were to include:

- Institutional controls to preclude use of ground water within the affected zones near the CR 126 West Area; and
- Ground water monitoring and contingent remedial measures that would be implemented if the plumes were to expand and threaten ground water uses for domestic and commercial/industrial purposes.

Based on the evaluation of the alternatives listed above, the results of site specific ISCO bench scale testing, a field pilot study which evaluated mechanical auger mixing of contaminated soils with a chemical oxidant (i.e., persulfate), and comments received during the public comment period, the selected remedy for the CR 126 West Area includes the following components:

- Using augers to mechanically mix the soils in the central disposal area of the CR 126 Area to a depth of 25 feet with chemical oxidant to treat the most affected soils and a portion of the shallow ground water zone (referred to as the S1 zone) and using lime, cement, or fly ash to strengthen the soils.
- Using a vapor capture system that will route vapors from the auger mixing to a treatment or adsorption system (such as a thermal oxidizer or activated carbon).
- Installing temporary security fencing around the active remediation area.
- Temporary rerouting, or replacing the county road around the treatment area.
- Placing temporary berms around the active remediation area.
- Hydro-mulch seeding of the disturbed area to provide erosion control.
- A new roadway after active remediation has been completed.
- Implementing institutional controls through either obtaining property ownership or restrictive covenants for the property necessary to implement the remedy and protect human health and the environment. Restrictions will be placed that will prohibit the installation of drinking water wells that may contribute to plume migration or result in exposure. The restrictions will also prohibit excavations in the CR 126 West Area without prior approval.

The estimated cost for the CR 126 West Area remedy (as presented in the *County Road 126 West Area Remedial Action Plan* (ERM, March 1, 2006)) is approximately \$7,800,000. The breakout of this estimated cost is presented in Table 10.

TABLE 10
CR 126 West Area
Estimated Conceptual Costs
In-Situ Soil Mixing with Chemical Oxidation

Task Description	Costs
Engineering & Planning	\$531,000
Agency Interaction and Meetings Planning, Access and Utilities Baseline Soil Testing Treatability Study, Bench Scale Testing Final Treatment Kennedy Design Surveying & Controls, Remedial Implementation Plan Design Specifications and Construction Quality Assurance Plan, Traffic Diversion Plan and Approvals Neighbor Temp. Relocation (4 Families Near FWR A)	
In-Situ Soil Mixing	\$1,816,289
Mobilization Site Preparation – Clear Asphalt Road and Setup Construct Temporary Bypass Road Setup Utilities – Water, Electricity, etc. Soil Mixing Using Dual Auger, Including Reagent Auger Anchoring System Remove and Stockpile Heaved Soil (20% by volume) Stabilize Subgrade (0 to 5 feet below ground surface) Prepare Subgrade, Geogrid (2 layers) Reconstruct CR 126, Asphalt Surface Topsoil Cover and Vegetation, Air Monitoring Health and Safety & Project Management	
Off-gas Treatment	\$197,198
Mobilization, Utilities & Setup Treatment Operation and Maintenance Water Separation Unit & Liquids Management GAC Scrubbers For Emergency (2 x 8000 lb beds) Operator & Expenses	
Stabilization of Treated Soil	\$489,864
Mobilization, Silo, Auger mixer, etc. Stabilize Soil (5 to 25 feet below ground surface) Construction Quality Assurance Air Monitoring, Health and Safety, Project Management, Construction Management	
Treatment and Disposal of Heaved Soil	\$93,239
Excavate and Load Heaved Soil Offsite Disposal and Class 2 Non-hazardous Transportation to landfill Sampling & Analysis, Characterization	
Ground Water Monitoring	\$1,622,184
Install & Complete S1 Monitoring Wells Install & Complete S2 Monitoring Wells Survey, Establish Baseline Data, Well Completion, Quarterly Monitoring (Sampling, Analysis, Reporting) Annual Monitoring	
Institutional Controls	\$1,493,000
Property Value Assessment and Negotiations Survey Control, Title Search, and Deed Acquire Land, Water Rights, Title Transfer, Closing Security Fence Inspections & Reporting (8 Quarterly, 3 Annual, 5 – 5 years) Periodic Limited Maintenance of CR 126	
Subtotal	\$6,242,800
Contingency (25%)	\$1,560,700
Estimated Total Costs	\$7,800,000

3.4 CR 126 West Area Technical Impracticability (TI) Evaluation

The purpose of this section is to discuss the reasons why the available remedial technologies will not achieve MCL drinking water standards in the CR 126 West Area aquifers within a reasonable time frame. EPA's 1993 "Guidance for Evaluating the Technical Impracticability of Ground Water Restoration" outlines three general factors that can inhibit ground water restoration and justify the granting of a TI waiver:

- Hydrogeologic factors;
- Constituent -related factors; and
- Remediation system inadequacies.

Investigations conducted at the CR 126 West Area and the other areas of the site indicate that the conditions in the CR 126 West Area related to each of the above three factors work to preclude the timely restoration of ground water.

Hydrogeologic factors in the CR 126 West Area are consistent with increased difficulty in remediation of contaminated soil and ground water and include a complex and heterogeneous stratigraphy of interbedded silts and clays and some sand, low hydraulic conductivity, a downward vertical gradient, and high temporal variation in the water levels. Given the overall clayey and silty nature of the S1 Sand in the CR 126 West Area, the removal or in-situ treatment of constituents will be limited because migration of contaminants or of treatment media (e.g., air, oxidants, or nutrients) will be limited by the following:

- Low hydraulic conductivity of the formation, limiting advective flow processes resulting in diffusion being the primary mass transfer mechanism; and
- The tendency of the clays to adsorb constituents and trap non-aqueous phase waste liquids (NAPLs), retarding their migration and limiting their availability to remedial recovery technologies.

The hydraulic conductivity of the shallow S1 Zone sandy layer is fairly low, about 5×10^{-4} cm/s (centimeters per second), due to its high clay and silt content. As a result, in the shallow zone the pumping rates are limited. The low hydraulic conductivity of the S1 Sand and the associated low pumping rate will limit the ability of a ground water recovery system to effectively remediate the shallow ground water. For example, the S1 shallow zone pump tests indicated a 4-foot draw down at a pumping rate of only 0.1 gallon per minute. At pumping rates this low it will take many years for a ground water recovery system to effectively flush multiple volumes of water through the affected portion of the shallow zone, making remediation ineffectual.

In contrast to the S1, the hydraulic conductivity of the intermediate zone (the upper portion of the S2 Sand) is higher, or about -1×10^{-2} cm/s. As a result, in the intermediate/deeper zone the pumping rates are greater. For example, an aquifer test in the intermediate zone indicated that a 7-foot draw down was achieved at a rate of 10 gallons per minute, indicating that a higher pumping rate could have been tolerated.

However, the distribution of constituents in the C2 Clay between the S1 and S2 Sands will limit the ability of a ground water recovery system to effectively remediate the S2 Sand and to recover constituents adsorbed onto the intervening clays.

The hydraulic conductivity of the clays and silty clays in the C1 Clay, S1 Zone, and C2 Clay appears to be about four orders of magnitude less than the sandy materials (i.e., less than 1×10^{-7} cm/s). The low permeability of the clays and silty clays will limit the ability of in-situ remedial technologies to recover contaminants adsorbed onto the silts and clays. The clays and silty clays will, therefore, serve as an ongoing diffusion-limited source of constituents to the S1 and S2 Sands that will limit the long-term ability of remedial efforts to clean up those aquifers.

Constituent and source-related factors at the CR 126 West Area indicative of difficult remedial conditions, identified in the US EPA's TI guidance, include a complex contaminant distribution [as reflected by the historical disposal of aqueous and non-aqueous phase liquids (NAPL) that penetrated about 40 ft into the ground, the large volume of affected media encompassing a 5-acre area, and deep affected media within the S2 Sand at depths up to 85 feet below ground surface], the large volume of the original release over several years (as reflected in the total mass estimated to be present), and a complex mix of chemical properties for the constituents in the wastes disposed in or near the CR 126 West Area. Based on an evaluation of the contaminant mass distribution (see Table 9), one can derive the following:

- Over 99% of the total contaminant mass is contained within the low permeability clays and silts of the C1, S1, and C2 zones. Consequently, this portion of the mass will be difficult to remove via extraction technologies due to the low permeability of the clays and silts in these zones.
- Approximately 24% of the contaminant mass is found in the C2 Clay layer between the shallow S1 Zone and the intermediate/deeper zones of the S2 Sand. Consequently, this portion of the mass would be difficult to remove and would represent a continuing source of contaminant constituents that would dissolve or diffuse into the S2 ground water.
- Less than 1% of the mass is present as dissolved contaminants in the S1 and S2 Sands. Consequently, recovery technologies would remove less than 1% of the mass present. Even if the shallow vadose zone soils were excavated, extraction of the remainder of the mass (about 90%) would be limited by the very slow process of diffusion from the clays and silts in the CR 126 West Area.

It should be noted that the contaminants reported present in the soil and ground water of the CR 126 West Area represent a complex mixture of aromatic and chlorinated hydrocarbons and alcohols as well as metals. Therefore, remedial technologies that may work well for one family of constituents may not be effective for another. For example, one common approach for chlorinated solvent plumes is to use a reactive barrier composed of ferric iron. However, such a reactive barrier will not work for benzene and other aromatic hydrocarbons and alcohols. Similarly, attempts to in-situ aerobically degrade the aromatic hydrocarbons with the injection of oxygen and nutrients will not be

effective for chlorinated hydrocarbons such as dichloroethene and dichloroethane and could disrupt the natural attenuation processes currently occurring.

As part of the TI evaluation, various remediation methods were evaluated. As has been demonstrated by the remedial efforts of Lyondell Chemical Company and Atlantic Richfield, the combination of the hydrogeologic conditions and contaminant related factors have limited the effectiveness of numerous remedial approaches to attaining complete restoration of contaminated soils and the underlying aquifers. However, it is important to note that these same hydrogeologic conditions and contaminant related factors have also assisted in preventing the migration of contaminants. Despite the fact that disposal occurred over 30 years ago, migration of affected ground water has been limited to less than about 200 ft in the S1 Sand and less than about 300 ft in the S2 Sand for most constituents. Therefore, for practical purposes, the source can be considered naturally contained.

As concluded above, the EPA has determined, based on years of remedy implementation of numerous remedial technologies across the site, various studies, and other factors (i.e., hydrogeologic, contaminant related), that in areas where disposal has taken place, including the CR 126 West Area, complete restoration of contaminated ground water to Federal drinking water standards is technically impracticable.

Table 11 provides estimates of the remediation times and limiting factors for the various remedial systems that were evaluated.

TABLE 11
CR 126 West Area Remediation Methods
Projected Restoration Timeframes & Limiting Factors

Remediation Method	Projected Restoration Time (yrs)	Limiting Factor(s)
Source Excavation	> 100 yrs	Unable to remove contaminants from saturated zone
Natural Attenuation	> 100 yrs	Demonstrated as occurring but a lengthy process
Soil Vapor Extraction	> 100 yrs	Low permeability soils in surficial and vadose zones; unable to remove contaminants from within the saturated zone
Pump and Treat	> 100 yrs	Subject to long-term rebound effects; unable to remediate the surficial and vadose zones.
Oxidation of Residual Source Mass	> 100 yrs	Low permeability soils in surficial and vadose zones limit ability to oxidize contaminants in those regions; potential to upset existing natural attenuation processes currently in place.

3.5 Monitor Well (MW) 109 Ground Water Data

During the implementation of active remedial activities at the site, Lyondell Chemical Company and Atlantic Richfield Company would periodically sample all existing monitoring wells at the site. The results of the sampling efforts were included with all other data collected as part of their monthly progress reports. From August 1, 2000, through May 17, 2005, MW-109 was sampled 21 times. MW-109 is located approximately 1000 feet east of CR 126 West Area and 300 feet west of the West Road Area along CR 126 (See Figure 30) and is screened in the S1 sand. A summary of the detected contaminants identified as contaminants of concern in the 1991 ROD, 1998 ROD Amendment, and in this ROD Amendment are presented in Table 12.

Ground water samples collected from MW-109 did find elevated contaminant concentrations – primarily benzene. In general, the benzene ground water concentration has decreased over time but still remains well above the MCL of 5 µg/L. In an effort to determine the extent of ground water contamination in the area around the MW-109 well was also impacted, data from the nearest wells (i.e., MW-33, MW-108, and MW-110) were evaluated.

MW-33 is the closest monitoring well to MW-109 and is located south of CR 126 approximately 125 feet east/southeast of MW-109. MW-33 is a shallow well screened in the S1 sand. From September 30, 1997 through May 17, 2005, MW-33 was sampled 20 times. A summary of the detected contaminants identified as contaminants of concern in the 1991 ROD, 1998 ROD Amendment, and in this ROD Amendment are presented in Table 13. Ground water samples collected from MW-33 did find elevated tert-butyl alcohol concentrations from 1997 through early 2002. Since August 13, 2003, no contaminants of concern have been detected.

MW-108 is located directly west of MW-109 and along CR 126 approximately 500 feet from MW-109. MW-108 is a shallow well screened in the S1 sand. From August 1, 2002 through May 17, 2005, MW-108 was sampled 13 times. A summary of the detected contaminants identified as contaminants of concern in the 1991 ROD, 1998 ROD Amendment, and in this ROD Amendment are presented in Table 14. Ground water samples collected from MW-108 did find one detect of tert-butyl alcohol (2840 µg/L) above TCEQ's protective concentration limit of 2200 µg/L.

MW-110 is located directly south of MW-108 on the south side of CR 126. MW-110 is a shallow well screened in the S1 sand. From August 1, 2001 through May 17, 2005, MW-110 was sampled 14 times. A summary of the detected contaminants identified as contaminants of concern in the 1991 ROD, 1998 ROD Amendment, and in this ROD Amendment are presented in Table 15. Ground water samples collected from MW-110 did find two detections of benzene above the 5 µg/L MCL (i.e., 310 µg/L and 192 µg/L). Four sampling rounds with no detectable benzene concentrations have taken place since the August 13, 2003 detection.

FIGURE 30
Location of MW-109

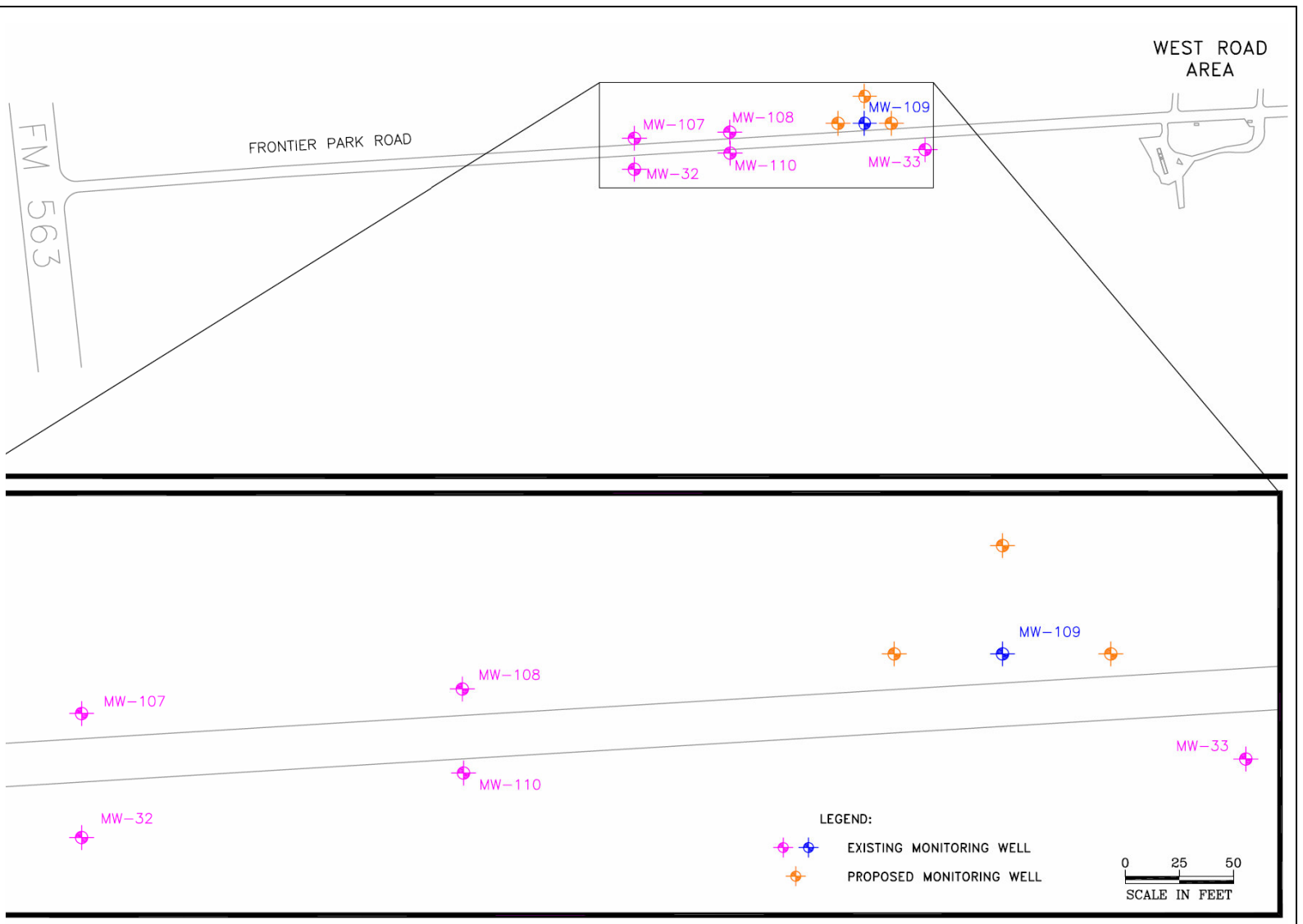


TABLE 12
MW-109 Ground Water Sampling Data Summary

ROD Criteria Sample Date	Benzene (5 µg/L)	Ethylbenzene (700 µg/L)	Naphthalene (327 µg/L)	Tert-butyl alcohol (2200 µg/L)	Toluene (1000 µg/L)	Vinyl Chloride (2 µg/L)	Xylene (Total) (1000 µg/L)
08/01/2000	9100 D	15	ND	ND	1750 D	ND	94
10/25/2000	11000	ND	ND	ND	1200	ND	ND
02/08/2001	11000	ND	ND	ND	130 J	110 J	ND
08/11/2001	8300	ND	ND	ND	290	ND	ND
02/13/2002	13000 D	83 J	200 J	ND	350	ND	100 J
04/10/2002	ND	ND	ND	ND	ND	ND	ND
04/11/2002	ND	ND	ND	ND	ND	ND	ND
04/12/2002	16	ND	ND	ND	11	ND	ND
04/13/2002	11	ND	ND	ND	ND	ND	ND
04/15/2002	ND	ND	ND	ND	ND	ND	ND
04/16/2002	ND	ND	ND	ND	ND	ND	ND
04/17/2002	ND	ND	ND	ND	ND	ND	ND
05/23/2002	9400	ND	180 J	ND	ND	ND	100 J
08/28/2002	6000	54 J	150 J	440 J	52 J	ND	50 J
03/11/2003	7400	55 J	ND	ND	56 J	ND	80 J
08/12/2003	2450	ND	128	ND	ND	ND	ND
03/02/2004	2790	ND	ND	ND	ND	ND	ND
07/23/2004	3390	ND	85	ND	ND	ND	ND
09/02/2004	3000	ND	106	ND	ND	ND	ND
02/10/2005	1510	ND	79	ND	ND	ND	ND
05/17/2005	2380	ND	82	ND	ND	ND	ND

Notes

All concentrations in µg/L.

Only contaminants of concern with at least one sample detection are presented.

Shaded detections exceed the ROD/ROD Amendment cleanup criteria.

D Duplicate sample.

J Concentration detected below analytical detection limit.

ND Not detected above analytical detection limit.

TABLE 13
MW-33 Ground Water Sampling
Data Summary

ROD Criteria Sample Date	Benzene (5 µg/L)	1,2 Dichloroethene (70 µg/L)	Naphthalene (327 µg/L)	Tert-butyl alcohol (2200 µg/L)
09/30/1997	ND	ND	ND	25000 E
02/01/1999	ND	ND	ND	44000
06/23/1999	ND	ND	ND	8900 D
08/05/1999	ND	ND	ND	6000
11/18/1999	ND	ND	ND	620
04/30/2000	ND	ND	ND	22000
10/23/2000	ND	ND	ND	4600 D
02/04/2001	ND	ND	ND	43000 D
08/10/2001	ND	ND	ND	3900 E
02/13/2002	1 J	ND	ND	5800 D
05/28/2002	ND	ND	ND	490
09/03/2002	3 J	5 J	3 J	160
03/04/2003	ND	ND	ND	340
08/13/2003	ND	ND	ND	ND
04/13/2004	ND	ND	ND	ND
05/11/2004	ND	ND	ND	ND
06/22/2004	ND	ND	ND	ND
07/23/2004	ND	ND	ND	ND
02/22/2005	ND	ND	ND	ND
05/17/2005	ND	ND	ND	ND

Notes

All concentrations in µg/L.

Only contaminants of concern with at least one sample detection are presented.
Shaded detections exceed the ROD/ROD Amendment cleanup criteria.

D Duplicate sample.

E Analyte concentration exceeded calibration range of instrument.

J Concentration detected below analytical detection limit.

ND Not detected above analytical detection limit.

TABLE 14
MW-108 Ground Water Sampling
Data Summary

ROD Criteria	1,1 Dichloroethane (2400 µg/L)	Tert-butyl alcohol (2200 µg/L)
Sample Date		
08/01/2000	ND	ND
10/25/2000	ND	ND
02/08/2001	7	ND
08/11/2001	89	ND
02/13/2002	9	ND
05/23/2002	9	ND
08/28/2002	5	10 J
03/06/2003	8	ND
08/12/2003	6	ND
03/02/2004	7	ND
09/02/2004	6	ND
02/10/2005	7	ND
05/17/2005	6	2840

Notes

All concentrations in µg/L.

Only contaminants of concern with at least one sample detection are presented.

Shaded detections exceed the ROD/ROD Amendment cleanup criteria.

J Analyte concentration detected below detection limit.

ND Not detected above analytical detection limit.

TABLE 15
MW-110 Ground Water Sampling
Data Summary

ROD Criteria Sample Date	Benzene (5 µg/L)	1,1 Dichloroethane (2400 µg/L)	Tert-butyl alcohol (2200 µg/L)	Xylene (Total) (10000 µg/L)
08/01/2000	ND	ND	ND	ND
10/25/2000	ND	ND	ND	ND
02/04/2001	ND	ND	ND	ND
08/10/2001	ND	ND	910	ND
11/16/2001	ND	ND	ND	ND
02/13/2002	ND	ND	ND	ND
05/23/2002	ND	ND	ND	ND
08/28/2002	310 D	2 J	15 J	1 J
03/04/2003	ND	ND	ND	ND
08/13/2003	192	6	ND	ND
03/02/2004	ND	5	ND	ND
09/02/2004	ND	5	ND	ND
02/10/2005	ND	7	ND	ND
05/17/2005	ND	ND	646	ND

Notes

All concentrations in µg/L.

Only contaminants of concern with at least one sample detection are presented.
Shaded detections exceed the ROD/ROD Amendment cleanup criteria.

D Duplicate sample.

J Concentration detected analytical below detection limit.

ND Not detected above analytical detection limit.

In addition to the monitoring wells previously discussed, three temporary wells were installed in April 2005, near MW-109 by Tetra Tech EM Inc. on behalf of the US EPA. Figure 31 shows the approximate locations of these wells. Due to the presence of an elevated utility line, the installed locations of the temporary wells were adjusted slightly such that the temporary wells were installed about 30 feet north of the road in a line parallel to CR 126. Each of the temporary wells were installed and screened within the S1 unit to a depth of 33 feet below ground surface. Ground water samples were collected from the temporary wells and analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and target analyte list (TAL) metals. The analytical results for the detected analytes are summarized in Table 16. Concentrations detected in ground water were compared to MCLs or the US EPA Region 6 MSSSLs for tap water (if no MCL was available).

No SVOCs were detected in any of the ground water samples collected from the temporary wells. VOCs were detected in the ground water samples collected from temporary wells TW-05 and TW-06; no VOCs were detected in the ground water samples collected from temporary well TW-04. Chloroform and 1,1-dichloroethane (both VOCs) were detected in the ground water sample collected from TW-05; the detected concentrations of both chemicals were below their respective MCLs. Six VOCs (benzene, cyclohexane, isopropylbenzene, methylcyclohexane, toluene, and xylenes) were detected in the ground water below their respective MCLs or US EPA Region 6 MSSSLs for tap water. Various inorganic compounds were detected in the ground water samples collected from the three temporary wells; all detected inorganic concentrations were below their respective MCLs or the US EPA Region 6 MSSSLs for tap water.

In addition to the temporary wells, there is one residential drinking water well located approximately 150 feet northwest of MW-109. The placement of the temporary wells (discussed previously) was between the MW-109 well and the residential drinking water well. The residential well was installed in September 2000 to a completed depth of 186 feet. The well screen is set between 176 and 186 feet below the ground surface. The drinking water well was constructed to prevent the well from acting as a migration pathway for ground water from the shallow water bearing zone into deeper water bearing zones.

The residential well located nearest MW-109 was sampled in February 2005 and again in June 2005. Ground water samples were analyzed for VOCs, SVOCs, and TAL metals. All samples results were provided to the landowner. The sample collected in February 2005 found no SVOCs and two VOCs – bromomethane and chloromethane. The analytical results for bromomethane and chloromethane were qualified by the laboratory due to contamination found in the laboratory blank. Manganese, which is naturally occurring, was detected at a concentration of 83.8 µg/L. This value exceeded the US EPA's secondary MCL manganese standard of 50 µg/L. Secondary MCLs are not

FIGURE 31
Approximate Location of MW-109 Area Temporary Wells

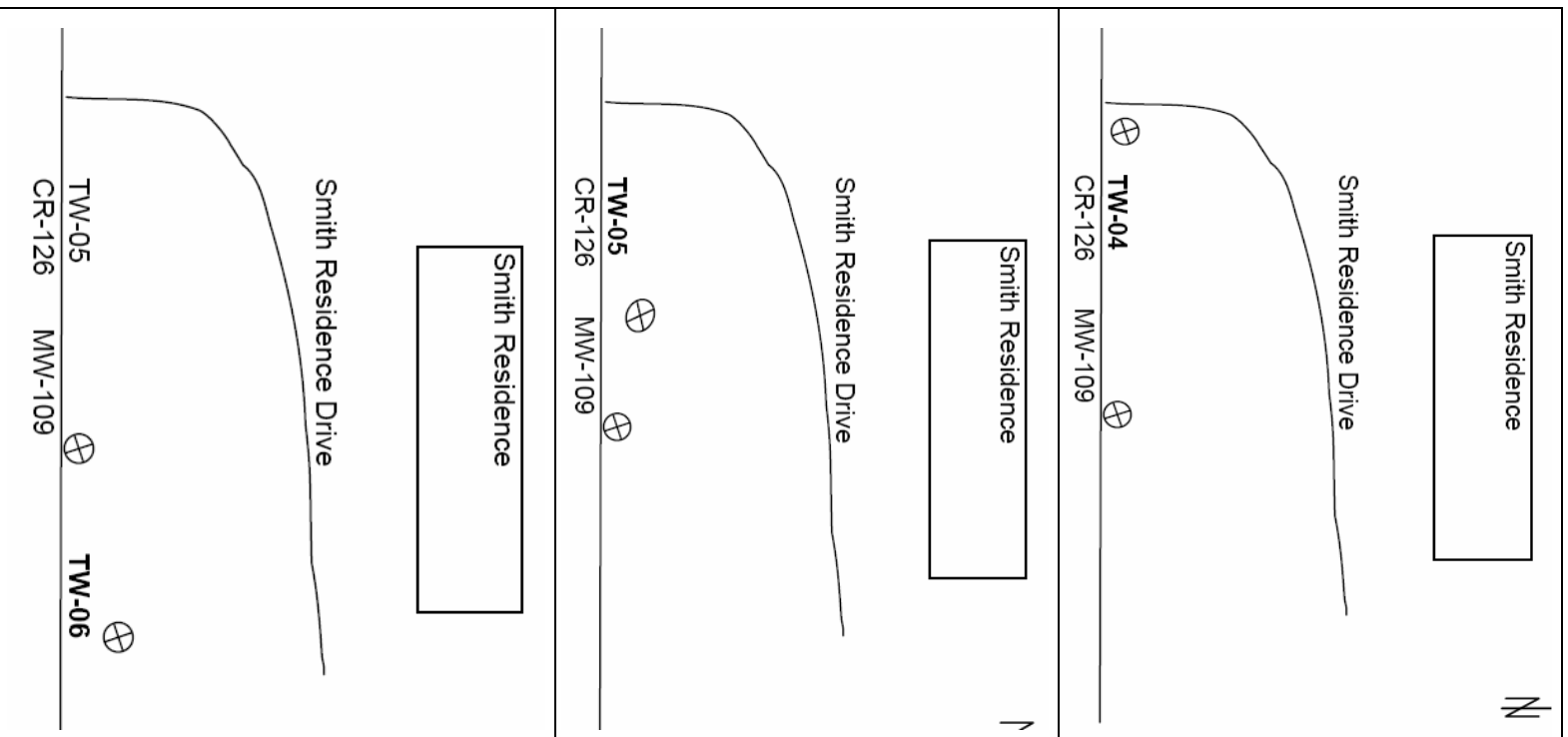


TABLE 16
Summary Results – MW-109 Temporary Wells

Analyte	TW-04	TW-05	TW-06	Ground Water Screening Value ^A
Volatile Organic Compounds (µg/L)				
Benzene	<0.50	<0.50	3.2	5
Chloroform	<0.50	0.13 LJ	<0.50	70
Cyclohexane	<0.50	<0.50	0.21 LJ	NA
1,1-Dichloroethane	<0.50	0.16 LJ	<0.50	810
Isopropylbenzene	<0.50	<0.50	0.27 LJ	660
Methylcyclohexane	<0.50	<0.50	0.13 LJ	5200
Toluene	<0.50	<0.50	0.17 LJ	1000
Xylenes (Total)	<0.50	<0.50	0.92	10000
Inorganic Compounds (µg/L)				
Aluminum	196 LJ	628	228	37000
Barium	201	<200	<200	2000
Calcium	101000	132000	87100	NA
Iron	<100	336	23.2	11000
Magnesium	8790	12800	11100	NA
Manganese	22.8	47.3	17.8	1700
Mercury	0.040 LJ ^v	<0.20	<0.20	2
Selenium	<0.35	5.0 LJ	<0.35	180
Sodium	199000	285000	257000	NA
Vanadium	1.7 LJ	1.9 LJ	1.9 LJ	37

Notes

^A Maximum Contaminant Levels (MCLs) or US EPA Region 6 Medium- specific Screening Levels (MSSL; EPA 2003) for tap water were used as the ground water screening levels.

No semivolatile organic compounds were detected in the ground water samples collected from the temporary wells.

^J Estimated value

^L Reported concentration is below the contract-required quantitation limit.

^{NA} Not available - no MCL or tap water MSSL.

^{µg/L} Microgram per liter.

^{TW} Temporary well.

enforceable and are set as guidelines to assist public water systems in managing their drinking water for aesthetic considerations, such as taste or odor. The sample collected in June 2005 found no SVOCs and one VOC (bromomethane); however, the sample results for bromomethane were qualified by the laboratory due to contamination found in the laboratory blank sample. Manganese, which is naturally occurring, was detected at a concentration of 77.8 µg/L.

3.6 Ground Water Cleanup Standards

This ROD Amendment amends the site's ground water contaminant cleanup levels to include levels for contaminants detected at elevated concentrations in the CR 126 West Area and at multiple locations throughout the site. Specifically, vinyl chloride, 1,2-dichloroethane, cis-1,2-dichloro-ethylene, trans-1,2-dichloroethylene, 1,2-dichloropropane, 1,1,2-trichloroethane, trichloroethylene, 1,1-dichloroethylene, styrene, and toluene. The ground water cleanup levels are based on their Federal drinking water standards [i.e., Maximum Contaminant Levels (MCLs)]. An MCL is the highest level of a contaminant that EPA allows in drinking water.

Additional contaminants detected at elevated concentrations are acetone, 1,1-dichloroethane, and tert butyl alcohol. These contaminants do not have established federal cleanup criteria for the site for either soil or ground water. The Texas Commission on Environmental Quality (TCEQ) has recommended the following ground water cleanup values for these contaminants: acetone (22,000 µg/L), 1,1-dichloro-ethane (2,400 µg/L), and tert butyl alcohol (2,200 µg/L). These TCEQ ground water cleanup values are Texas Risk Reduction Program (TRRP), Tier One Ground Water Protective Concentration Limits (PCL) and are recommended when complete site-specific information is not available. A summary of the ground water standards from the previous site decision documents (i.e., 1991 ROD), and those discussed above are presented in Table 17.

3.7 Soil Cleanup Criteria

The remedial levels the US EPA had previously determined would provide for protection of human health and the environment, based on a residential exposure scenario, are presented in the 1991 ROD and amended in the 1998 ROD Amendment. These soil remedial levels are summarized in Table 18.

Since the 1998 ROD Amendment, a significant change in the site's current and anticipated land use has occurred for large portions of the site. Specifically, the site's West Road Area, Main Waste Area, Office Trailer Area, and Easement Area, residential land use is longer reasonably anticipated. Lyondell Chemical Company has acquired these properties and will restrict access to these areas so that residential use will not occur. In regards to the CR 126 West Area and the Bayou Disposal Area, EPEC Polymers Inc. has initiated contacts with landowners regarding sale or deed restrictions

TABLE 17
Ground Water Protection Standards

Contaminant	Ground Water Cleanup Standard (µg/L)	Criteria
Benzene	5.0	MCL (1991 ROD)
Ethylbenzene	700	MCL (1991 ROD)
Xylene	10000	MCL (1991 ROD)
Naphthalene	327	Health Based Value (1991 ROD)
Lead	15	Action level (1991 ROD)
1,2-dichloroethane	5	MCL
1,1-dichloroethylene	7	MCL
Cis-1,2-dichloroethylene	70	MCL
Trans-1,2-dichloroethylene	100	MCL
1,2-dichloropropane	5	MCL
1,1,2-trichloroethane	5	MCL
Trichloroethylene	5	MCL
Styrene	100	MCL
Toluene	1000	MCL
Vinyl chloride	2	MCL
Acetone	22000	TCEQ TRRP Tier One PCL
1,1-dichloroethane	2400	TCEQ TRRP Tier One PCL
Tert butyl alcohol	2200	TCEQ TRRP Tier One PCL

Notes:

MCL Maximum Contaminant Level
 TRRP Texas Risk Reduction Program

that allow EPEC Polymers Inc. to purchase the properties or ground water rights and/or provide land use restrictions. In consideration of this fact, additional non-residential direct contact soil cleanup criteria were developed. In developing the new criteria, the EPA and TCEQ considered both TCEQ's Tier 1 Commercial/Industrial Soil Protective Concentration Limits (PCLs) and a site specific exposure evaluation. It was estimated that potential future exposures could result from road utility workers, trespassers, fence construction/maintenance workers and contractors involved in the ground water monitoring program. Some of the following assumptions were used in the site specific worker evaluation:

- Worker will be involved in soil intrusive (i.e., digging) activities in impacted soils from 0 –5 feet below ground surface;
- Worker would be digging at the site for 90 days a year for 25 years (conservative assumption – not expected to occur);
- Soil ingestion, inhalation, and dermal exposure pathways were considered;

TABLE 18
Soil Remedial Goals
1991 ROD and 1998 ROD Amendment

Contaminant		Soil Cleanup Level (ppm)	Soil Cleanup Rationale
Benzene	Depth Interval (feet bgs)		TCEQ residential exposure standard in soil from 0 to 2 feet below ground surface.
	0 - 2	1.33	
	2 - 4	10	See ^A below.
	4 - 10	200	See ^B below.
	> 10	20	See ^C below.
Lead		500	See ^D below.
Naphthalene		70	Health Based Value

Notes:

^A The remedial goal for benzene in soil was determined based on the potential for the benzene contamination in the soil to leach into the underlying groundwater aquifer, resulting in benzene contamination of the groundwater exceeding the benzene MCL for drinking water.

^B The basis for the 200 parts per million (ppm) benzene soil remediation criteria (from 4 to 10 feet below ground surface - bgs) was based in part on the SESOIL model calculated infiltration rate (in the absence of organic fluid) and the effect of intrinsic bioremediation processes such as microbial fermentation on residual benzene concentrations. SESOIL is a one-dimensional vertical transport model for the unsaturated soil zone. The soil criteria assessment report concluded that the post-active remediation residual benzene would not reach the aquifer unless present as NAPL (Non-aqueous Phase Liquid). Therefore, the 4 to 10 feet bgs soil cleanup criteria was based on the potential for NAPL to occur. NAPL is not likely to be present where soil benzene concentrations are less than 200 ppm.

^C The 20 ppm benzene soil remediation criteria (below 10 feet bgs) was based in part on the SESOIL model calculated infiltration rate and the migration of benzene dissolved in infiltrating water through the base of the upper clay unit to ground water, where it would be subject to aerobic in-situ bioremediation.

^D The lead concentration goal was based in the Interim Guidance on establishing Soil Lead Cleanup Levels at Superfund Sites, September 7, 1989.

- Conservative assumptions for soil ingestion and inhalation were used;
- Exposure concentrations were calculated to equate to a 1 in 100,000 chance of developing cancer; and
- For compounds known not to cause cancer (i.e., naphthalene), risk derived soil cleanup concentrations were calculated to estimate values that are unlikely to produce an adverse effect.

In response to EPEC Polymers, Inc. comment on the Proposed Plan, the EPA did evaluate the standard construction worker exposure assumptions discussed in EPA's *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (OSWER 9355.4-24, December 2002). Additionally, EPA also evaluated the outdoor worker exposure assumptions, which were also discussed in EPA's guidance document. The following is a summary of these exposure assumptions:

Construction Worker – This is a short-term adult receptor exposed to soil contaminants during the work day for the duration of a single construction project (typically a year or less). If multiple non-concurrent construction projects are anticipated, it is assumed that different workers will be employed for each project.

Outdoor Worker – This is a long-term receptor exposed during the work day who is a full time employee of the company operating on the site and who spends most of the workday conducting maintenance outdoors. The activities for this receptor (e.g., moderate digging, landscaping) typically involve on-site exposures to surface and shallow soils (at depths of zero to two feet).

Exposure default factors used in calculating the soil cleanup criteria for the site specific, construction worker, and outdoor worker are presented in Table 19.

TABLE 19
Various Exposure Factors

Default Exposure Factors	Site Specific Worker	Construction Worker	Outdoor Worker
Exposure Frequency (days/year)	90	250	225
Exposure Duration (years)	25	1	25
Soil Ingestion Rate (milligrams/day)	360	330	100
Inhalation Rate (cubic meters/day)	30	20	20
Body Weight (kilograms)	70	70	70
Lifetime (years)	70	70	70

Using the various exposure factors presented above, soil cleanup criteria were calculated to equate to a 1 in 100,000 chance of developing cancer. These calculated soil cleanup criteria values, in addition to the TCEQ's Tier 1 Commercial/Industrial Protective Concentration Limits (PCLs) and the Proposed Plan Non-Residential Soil remedial goals are present in Table 20 below:

TABLE 20
Calculated Soil Cleanup Goals

Contaminant	TCEQ Tier 1 Commercial Industrial PCL (mg/kg)	EPA Site Specific Worker Scenario		EPA Construction Worker (mg/kg)	EPA Outdoor Worker (mg/kg)	EPA Proposed Plan (mg/kg)
		Inhalation + Ingestion (mg/kg)	Inhalation + Ingestion + Dermal (mg/kg)			
Benzene	37	40	36	175	26	36
Vinyl Chloride	12	8.9	6	86	6	10
Naphthalene	190	375	375	375	375	190
Lead	1600	800	800	NC	NC	800

Notes: For lead, the US EPA Region 6 uses a soil lead concentration limit of 800 mg/kg for industrial workers.

mg/kg - milligrams/kilograms

NC - Not Calculated

For naphthalene – the saturation concentration is 375 mg/kg.

As can be seen in Table 20, using various exposure factors resulted in various calculated soil cleanup goals. Using EPA's construction worker exposure assumptions resulted in soil cleanup criteria which are greater than that which was presented in the Proposed Plan. Using the outdoor worker exposure assumptions resulted in soil cleanup criteria for benzene and vinyl chloride which are less than that which was presented in the Proposed Plan. It is important to note that in selecting the soil cleanup criteria, the EPA considered the fact that not all the chemicals known to be present at the site were evaluated in developing the soil cleanup criteria and that there are residents (adults and children) present at the site. In addition, the soil cleanup numbers were selected taking into consideration the potential for contaminant release to groundwater.

In consideration of the change in land use for large areas of the site, the following non-residential direct contact (i.e., for 0 – 5 feet below ground surface) soil cleanup criteria have been selected for benzene (36 parts per million – ppm), vinyl chloride (10 ppm), naphthalene (190 ppm), and lead (800 mg/kg). Documentation and/or sampling will be required to demonstrate compliance with the soil cleanup criteria.

3.8 Bayou Disposal Area - Information and Remedy Modification

The Bayou Disposal Area (BDA) is located immediately south of CR 126 and just west of the Turtle Bayou tributary (See Figure 32). Within the BDA is a pit were waste disposal took place. The BDA pit was originally identified in the 1990 remedial investigation to be an elongated barren area approximately 30 feet wide and 900 feet long based on a 1976 aerial photograph. Ground water at the BDA occurs in a shallow sand aquifer encountered about 12 feet below ground surface. The sand aquifer pinches out to

the south, and is not present at MW-14, which is located just south of the BDA (See Figure 33).

The 1991 ROD did not include the treatment of soil in the BDA because of the low contaminant levels of affected soils in this area. The remedy addressing the affected soils within the BDA, as identified in the 1991 ROD was vertical infiltration control by engineered soil and synthetic liner cap.

At the time of the 1998 ROD Amendment, soil data collected in the BDA indicated that BDA soils already met the Amended ROD soil cleanup criteria, while ground water data indicated occasional and sporadic exceedences of the benzene MCL value of 5 ppb. Benzene was detected in monitor wells MW-13R (11 ppb, August 8, 1996), MW-51 (10 ppb, January 7, 1997), and MW-100 (8 ppb, June 26, 1998). The selected remedy did not provide for the active treatment of soil in this area. Instead, the selected for the BDA in the 1998 ROD Amendment included:

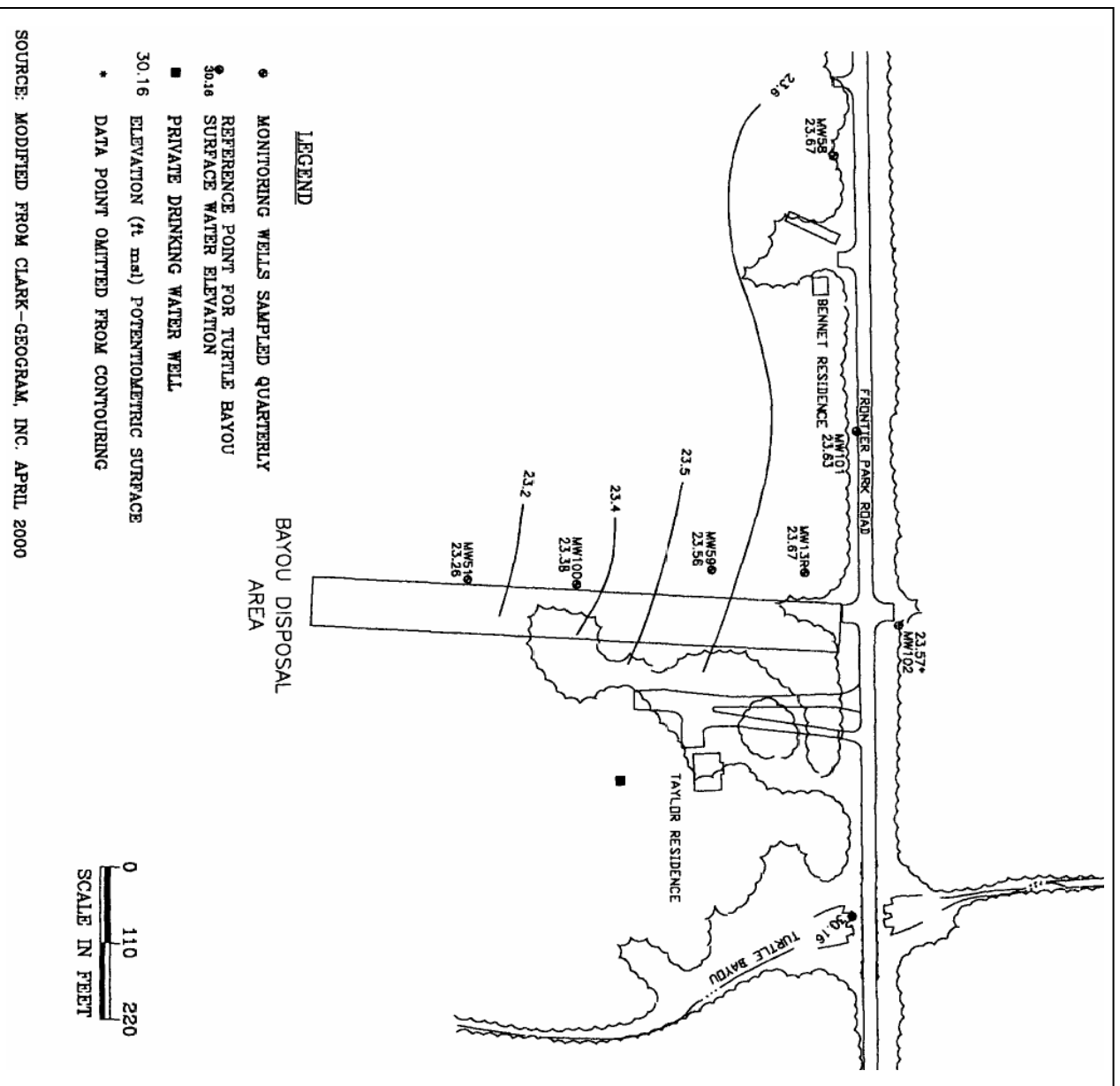
- A graded clay cap planted with select vegetation and developed so as to minimize the infiltration of rain water (i.e., living cap), and
- Ground water monitoring.

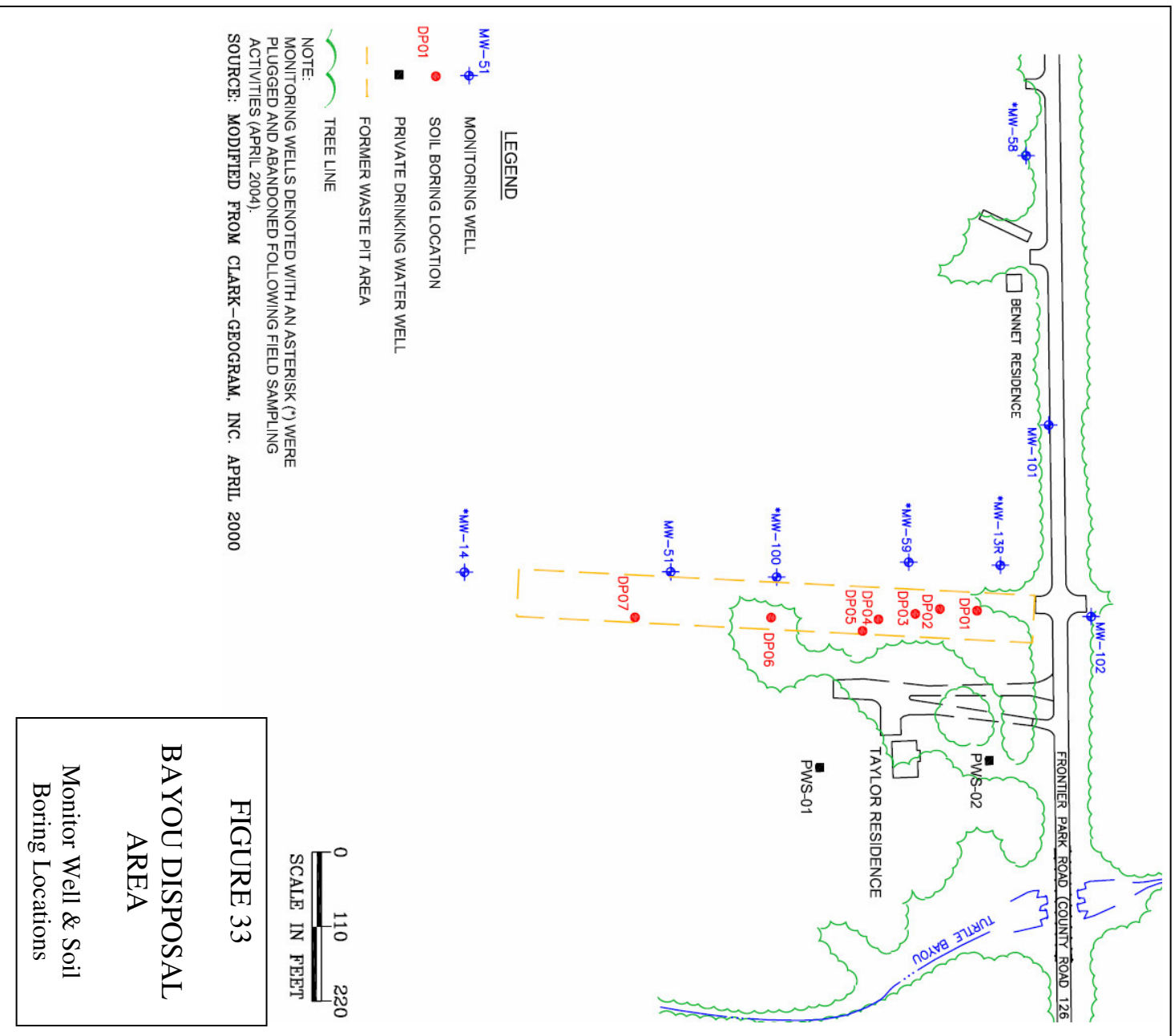
Since the 1998 ROD Amendment, several rounds of ground water monitoring have taken place. As of August 2002, eight rounds of ground water sampling had occurred. Seven monitoring wells were included in the monitoring network at the BDA: MW-13R, MW-51, MW-58, MW-59, MW-100, MW-101, and MW-102. Each of these wells were sampled for VOCs, SVOCs, and metals. Monitoring wells MW-58, MW-101, and MW-102 are located along CR 126 in hydraulically upgradient positions, and monitoring wells MW-13R, MW-51, MW-59, and MW-100 are located along the west flank of the BDA and are aligned in a north-south direction.

Based on an evaluation of the eight rounds of ground water monitoring, it was determined that for most chemicals from monitoring wells, there is little evidence of a onistent trend in concentration levels across the eight sampling events. Moreover, there is little evidence to suggest a temporal trend in the number of detected inorganic or organic chemicals in individual wells. The data does suggest that benzene and vinyl chloride in ground water is restricted to the area around MW-51. Although the benzene and vinyl chloride concentrations in MW-51 did not have clearly declining trends, concentrations appear to be stable.

With the exception of one sampling event in January 2001, in which both benzene and vinyl chloride concentrations were elevated at MW-51 (i.e., 23.7 ppb and 13.3 ppb, respectively), lower concentrations were recorded. Finally, strongly positive oxidation-reduction potentials and dissolved oxygen concentrations in the 2 to 6 milligram per liter range measured in all BDA wells strongly suggest that aerobic bioremediation is ongoing. The contaminants benzene and vinyl chloride readily biodegrade under aerobic conditions.

FIGURE 32
Bayou Disposal Area
Potentiometric Surface
Elevations, April 16–17, 2002





A new BDA well (MW-14) that was installed in 2004 was sampled and analyzed for VOCs, SVOCs, and metals in February 2004. No analytes were detected above their respective drinking water standards. MW-14 was subsequently abandoned. The seven remaining monitoring wells were sampled and analyzed for VOCs in February 2004. No VOCs were detected above the associated drinking water standards, and four of these wells were subsequently abandoned. Two of the three remaining wells have been monitored for metals, and one is being monitored for VOCs. VOCs have not been detected above their MCLs in the last four sampling rounds (see Table 21).

Between February 26 and March 1, 2004, soil samples were collected from seven borings within the former waste disposal pit in the BDA (see Figure 33). Each boring was advanced to the base of the pit or terminated at 15 to 16 feet below ground surface if the based could not be identified by visible discoloration. Each sample coring was screened for VOCs using a flame ionization detector (FID). Per the field sampling plan addendum, up to four separate samples were collected from each boring location:

- 0 to 2 feet below ground surface (surface soil);
- Soil-to-ground water (SGW) interface;
- Interval immediately below the base of the pit, if identified, or the base of the boring;
- Interval with the highest FID reading.

At four of the boring locations (DP01, DP02, DP04, and DP05), only three intervals were sampled as the interval with the highest FID reading coincided with the SGW interface interval. Table 22 provides a summary of the samples collected and their respective FID readings.

The samples were analyzed for VOCs, SVOCs, and target analyte list (TAL) metals. The results were compared to the US EPA Region 6 Medium-specific screening levels (MSSL) for residential soil. The majority of the organic analytes were infrequently detected; soil samples collected from DP05 had the highest occurrence of organic compounds at detectable levels. Benzene concentrations at location DP05 exceeded the MSSL of 0.66 mg/kg at all depths sampled. Benzo(a)pyrene was detected at a concentration of 0.084 LJ mg/kg at location DP05 at a depth of 0 to 2 feet below ground surface; benzo(a)pyrene was not detected in deeper samples collected at this location. Arsenic was detected at all sampling locations at concentrations exceeding the US EPA Region 6 MSSL of 0.39 mg/kg. No site-specific background arsenic values were available for comparison; however, the State of Texas median background level for arsenic is 5.9 mg/kg. At location DP02 (14 to 16 feet bgs), the arsenic concentration slightly exceeded the Texas median background level at 6.2 mg/kg. At location DP03, arsenic concentrations of 9 mg/kg and 18.6 mg/kg were reported for the 8 to 10 below ground surface and 10 to 12 below ground surface intervals, respectively. All other detected arsenic concentrations were below the Texas median background level.

TABLE 21
Bayou Disposal Area
Summary of Recent Ground Water Sampling

Well	Type	February 2004		June 2004		October 2004		February 2005	
		Exc.	Conc.	Exc.	Conc. (ppb)	Exc.	Conc. (ppb)	Exc.	Conc. (ppb)
MW-13R	MW	-	< SC ¹	Plugged and Abandoned					
MW-51	MW	-	< SC ¹	-	< SC ¹	-	< SC ¹	-	< SC ¹
MW-58	MW	-	< SC ¹	Plugged and Abandoned					
MW-59	MW	-	< SC ¹	Plugged and Abandoned					
MW-100	MW	-	< SC ¹	Plugged and Abandoned					
MW-101	MW	Cd	8.7	-	< SC ¹	Mn	283.0	Cd	8.0
MW-102	MW	-	< SC ¹	Cd	8.5	Mn/ Cd	1406/ 7.7	Cd	43.3
MW-14	MW	-	< SC ¹	Plugged and Abandoned					
PWS-01	PWS	As	17.1	As/ BEHP ²	16.8/ 16.0	NS		NS	
PWS-02	PWS	As	8.6	NS		NS		NS	

Notes:

- None
- < Less than
- As Arsenic (MCL = 10 ppb)
- BEHP bis(2-Ethylhexyl)phthalate
- Cd Cadmium (MCL = 5 ppb)
- Conc. Concentration in micrograms per liter
- Exc. Analytes exceeded the MCL or MSSL
- MCL Maximum contaminant level
- Mn Manganese (MCL = 50 ppb, MSSL = 1700)
- MSSL US EPA Region 6 Medium-specific screening level for tap water
- MW Monitoring well
- NS Not sampled
- PWS Private water supply well
- SC Screening criteria

- ¹ Screening criteria are MCLs for monitoring wells, and the lesser of MCLs or MSSL for private water supply wells.
- ² BEHP is a common plasticizer and may be an artifact of the ground water sampling method.

TABLE 22
Bayou Disposal Area
Summary of Soil Borings Collected
February/March 2004

Boring ID	Depth Description	Sample Interval (feet bgs)	FID Results (ppm)	Latitude	Longitude	Date Sampled
DP01	Surface	0.0 – 2.0	2.5	N 29°55.147'	W 94°40.091'	
	High FID/SGW	4.0 – 7.0	20			
	Base	14.0 – 16.0	10			
DP02	Surface	0.0 – 2.0	0	N 29°55.138'	W 94°40.092'	February 26, 2004
	SGW	8.0 – 10.0	12.5			
	High FID	10.0 – 12.0	20.3			
DP03	Base	14.0 – 16.0	2.2	N 29°55.132'	W 94°40.091'	
	Surface	0.0 – 2.0	0			
	High FID/SGW	8.0 – 10.0	13			
DP04	Base	14.0 – 16.0	30	N 29°55.123'	W 94°40.090'	
	Surface	1.0 – 2.0	2			
	High FID/SGW	8.0 – 10.0	38			
DP05	Base	13.0 – 15.0	12	N 29°55.119'	W 94°40.087'	February 27, 2004
	Surface	0.0 – 2.0	2,000			
	High FID/SGW	4.0 – 8.0	3,700			
DP06	Base	14.0 – 16.0	230	N 29°55.097'	W 94°40.092'	
	Surface	0.0 – 2.0	34			
	SGW	4.0 – 6.0	30			
DP07	High FID	6.0 – 8.0	38	N 29°55.064'	W 94°40.094'	March 1, 2004
	Base	14.0 – 16.0	13			
	Surface	0.0 – 2.0	0			
	SGW	4.0 – 6.0	2.5			
	High FID	6.0 – 8.0	10			
	Base	14.0 – 16.0	5.5			

Notes:

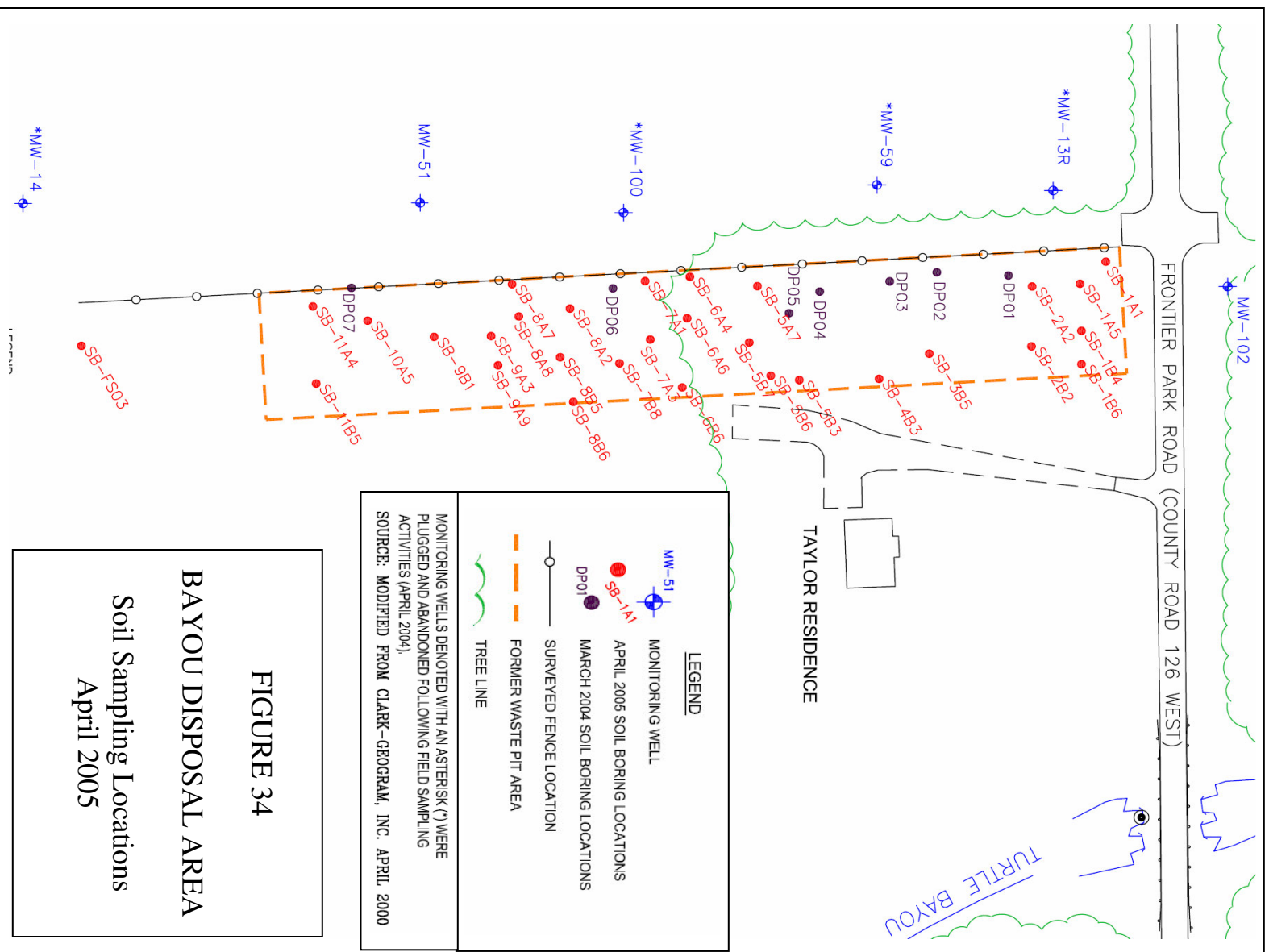
Base The sample was collected at the base of the soil boring
BDA Bayou Disposal Area
bgs Below ground surface
FID Flame ionization detector
High FID The sample collected from this depth interval had the highest FID reading.
ppm Part per million
SGW The sample was collected at the soil-to-ground water interface.
Surface Surface soil depth interval.
* Resolution confirmed; benchmarking not yet complete.

In April 2005, 29 additional soil samples were collected from the former waste disposal pit (see Figure 34). Soil borings were installed to 12 feet below ground surface at each location using direct push methods. A FID was used to screen the soil cores; the interval with the highest reading was selected for sampling. Soil samples were submitted for VOC, SVOC, and TAL metals analysis. The analytical results were compared to the US EPA Region 6 MSSLS for residential soil. Exceedences of the residential soil MSSLS are noted below:

- Benzene concentrations exceeded the residential soil MSSL of 0.66 milligram per kilogram (mg/kg) at six boring locations with concentrations ranging from 0.77 to 100 mg/kg.
- Methylene chloride was detected in a duplicate sample collected at boring SB-8A7 at a concentration of 11 J mg/kg, which exceeds the residential soil MSSL of 8.9 mg/kg; however, methylene chloride was not detected in the original sample collected at this location.
- Benzo(a)pyrene concentrations exceeded the residential soil MSSL of 0.062 mg/kg at three boring locations with concentrations ranging from 0.1 LJ mg/kg to 0.12 LJ mg/kg.
- Arsenic was detected at concentrations exceeding the residential soil MSSL of 0.39 mg/kg in all samples collected; however, with the exception of the sample collected at location SB-5B7, all detected concentrations were below the Texas-specific median background concentration of 5.9 mg/kg.
- Iron was detected at one boring location (BS-1A5) at a concentration of 25,800 mg/kg, which exceeds the residential soil MSSL of 23,000 mg/kg. All other concentrations of iron were below the residential soil MSSL.

The remedy for the site's Bayou Disposal Area will be amended to replace 1998 ROD Amendment requirement (i.e., living cap) with the following components:

- Limited excavation of up to 300 cubic yards of contaminated soil and offsite disposal at a permitted facility. Soil excavation will be conducted as necessary to achieve the soil remedial criteria.
- Run-off and run-on control and hydro-mulching as may be warranted to address potential erosion.
- Plugging or conversion of water wells presently located on the Bayou Disposal Area and potentially those wells located on nearby properties into monitoring wells.
- Institutional controls to limit potential exposure to affected ground water and soil.



The estimated cost for the Bayou Disposal Area remedy (as presented in the *Bayou Disposal Area Removal Action Plan* (ERM, March 1, 2006)) is \$950,000. The breakout of this estimated cost is presented in Table 23.

TABLE 23
Bayou Disposal Area
Estimated Conceptual Costs - Excavation and Off-Site Disposal

Task Description	Costs
Engineering & Design	\$95,000
Planning & Meetings, Engineering & Surveying Traffic Diversion Plan & Approval Neighbors Relocation, Project Specifications & Drawings Health and Safety, Air Monitoring	
Excavation	\$143,800
Mobilization, Prepare Site, Clear, Grub Containment Cover for Excavation Emissions & Odor Control Equipment, Excavate, Remove, & Stockpile Affected Soil, Backfill, Top Soil Placement, Hydroseeding, Ground Water Management, Waste Characterization, Construction Management	
Transportation & Disposal	\$127,100
Transportation Disposal as Hazardous	
Access and Site Control Cost	\$395,000
Property Value Assessment and Negotiations Survey Control, Title Search, and Deed, Acquire Land, Water Rights, Title Transfer, Closing, Security Fence	
Subtotal	\$761,000
Contingency (25%)	\$190,000
Estimated Total Costs	\$950,000

3.9 Main Waste Area Soils Vault - Information and Remedy Modification

The above ground soils vault is located in the northern section of site's the Main Waste Area. The vault was constructed pursuant to the 1987 Frontier Park Road Record of Decision (ROD). The original purpose of the vault was to serve as a temporary storage facility for the 5,900 cubic yards of contaminated soil excavated from the first 1,800 feet of Frontier Park Road. The vault was constructed to meet the requirements of a Resource Conservation and Recovery Act (RCRA) compliant landfill. The vault was constructed with a double-lined leachate collection/leak detection system and covered with a liner and topsoil. At the time of the ROD, it was estimated that operation and maintenance of the vault would take place for a five-year period until such time that the remedy for the entire site could be implemented.

As part of Lyondell Chemical and Atlantic Richfield Company's remedial action activities within the site's Main Waste Area, various remedial systems have been applied

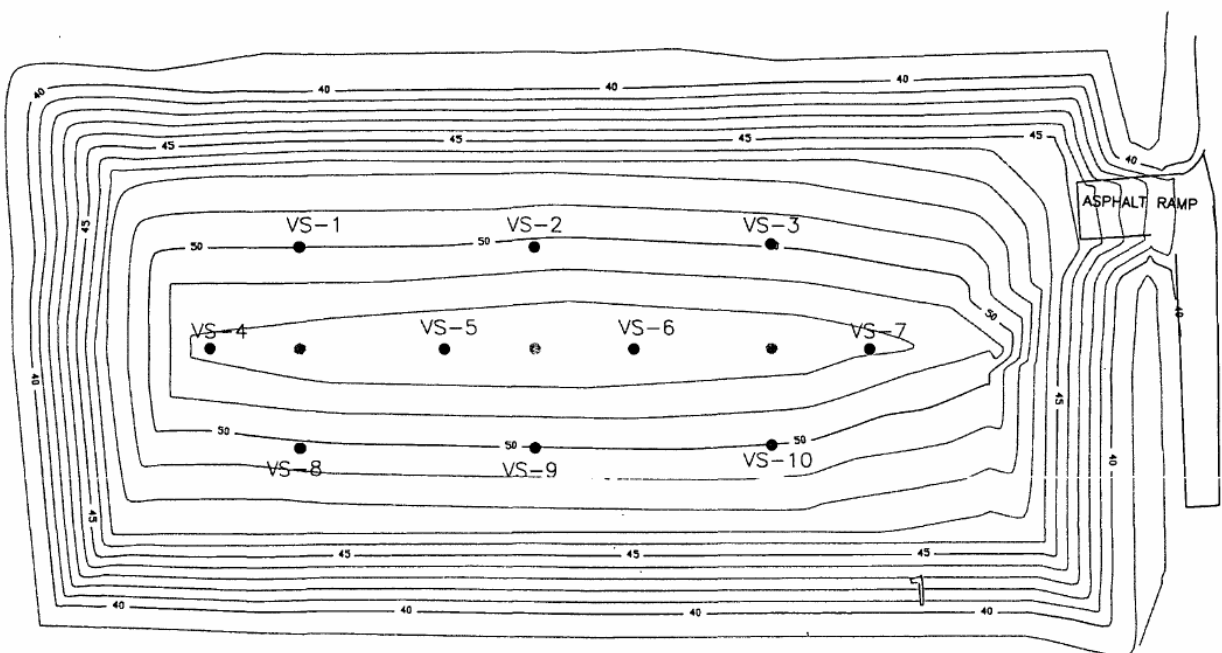
to treat the contaminated soils contained in the vault. Initially, soil vapor extraction wells were installed to extract contaminant-laden vapors from the landfill for treatment in the Main Waste Area thermal oxidizer. Soil washing was later applied to treat soils within the vault. Lyondell Chemical Company has informed the US EPA that contaminant levels in the on-site storage vault have been reduced, however, not to levels that would allow the contaminated soils to be spread on the ground. In April 2003, Lyondell requested that the US EPA and TCEQ consider their proposal that the vault be made a permanent remedy such that it need not be dismantled and the vault waste relocated. In June 2003, Lyondell Chemical Company collected soil samples within the vault for VOC and naphthalene analysis. Samples were collected from 10 locations (see Figure 35) and composited across four depth intervals. A summary of the detected contaminants is presented in Table 24.

Based on a review of the composite sample results, all of the composite samples are less than the TCEQ TRRP Commercial/Industrial Soil standards for 0 to 4 feet bgs. However, two of the four composite samples (D & E) exceeded the ROD's naphthalene soil standard of 70 mg/kg, and three of the four composite soil samples (D, E, & F) exceeded the ROD's benzene standard of 1.33 mg/kg for surface soil (i.e., 0 – 2 feet bgs).

In consideration of Lyondell Chemical Company's request, the US EPA and TCEQ will allow the vault to remain as long as the following requirements are maintained:

- Lyondell Chemical Company installs monitor wells around the vault for the purpose of monitoring ground water immediately up and down gradient to assist in long-term monitoring of the integrity of the vault.
- Lyondell Chemical Company, which has now secured ownership of the Main Waste Area property, shall erect fence around the property to prevent unauthorized access.
- The vault is to be maintained in perpetuity.
- The property owner (whether Lyondell Chemical Company or others) shall cause an institutional control in the form of an irrevocable deed restriction on the property, to be recorded in the real property records of Liberty County, Texas. The Deed Restriction shall:
 - By metes and bounds survey, describe the area of the permanent storage vault and such other areas necessary to ensure, in perpetuity, proper drainage, maintenance and monitoring of the storage vault and associated ground water monitoring wells, including fences erected to prevent unauthorized access to these areas;
 - Prohibit activities which might adversely affect the integrity of the storage facility;

Turtle Bayou Project Vault Sampling Locations



- Vault vent location
- Vault composite sampling location

FIGURE 35
Main Waste Area
Vault Sampling
Locations

TABLE 24
Main Waste Area Vault Samples

Contaminant (mg/kg)	Vault Composite C (~ 5 – 7 bgs)	Vault Composite D (~ 7 – 9 bgs)	Vault Composite E (~9 – 11 bgs)	Vault Composite F (~ 11 – 13 bgs)	TRRP Tier 1 Commercial/Industrial Soil Standard 0 – 4 foot Criteria (mg/kg)
Naphthalene	29.9	129	77.2	46.3	360
Acetone	ND	7.55 J	ND	ND	16,000
Benzene	ND	8.04	3.9	1.72	67
Ethylbenzene	2.27	12.4	7.47	4.16	18,000
Styrene	ND	5.14	2.5	1.75	--
Tert-butyl alcohol	51.1	97.6	49.4	38.2	15,000
Toluene	2.71	15.2	8.96	4.78	8,200
Xylene (Total)	1.5	15.83	11.21	5.97	2,100

Notes:

~ Approximate

bgs Below ground (i.e., landfill top) surface

J Estimated concentration

ND Not detected above analytical detection limit.

Composite C is the upper most composite (just beneath the top liner).

Composite F is the deepest composite (from the bottom liner and up two feet).

-
- Prohibit any activity or change which would interfere with Lyondell Chemical Company's ability to maintain and preserve the integrity of the vault storage facility and associated monitor wells; and
 - Provide for perpetual access to the storage facility by Lyondell Chemical Company, US EPA, and TCEQ and their contractors for the purposes of maintenance, monitoring or any other activity necessary to ensure continued integrity of the storage vault and associated monitoring wells.
 - Lyondell Chemical Company shall enter into a written agreement with US EPA which binds Lyondell Chemical Company to, in perpetuity, maintain the storage vault, including associated security fencing and ground water monitoring wells, and including removal of any leachate accumulated in the leachate collection system, all in accordance with an Operations and Maintenance Plan which shall be reviewed and approved by the US EPA and the TCEQ.

3.10 Establishment of Technical Impracticability Zones

Prior to defining the TI zones at the site, a two-year transitional monitoring period will occur. The goal of the two-year transitional period is to establish ground water contaminant plume baselines and for evaluating the site's natural attenuation processes. A monitoring network will collect contaminant, hydrogeologic and geochemical parameters for evaluation during the transition period, in both the S1 and S2 sands, to appropriately characterize the hydrogeologic conditions and the lateral and vertical extent of any contamination that exceeds the groundwater protection standards.

Evaluation of this information will lead to a better understanding of natural biodegradation processes occurring in the aquifer and their effect on further contaminant mass reduction. The primary monitoring objective will be to determine whether the plumes are stable or declining in nature and that there is no risk to receptors, and to determine whether the selected remedy is effective to prevent contaminants with concentrations exceeding the ground water protection standards from migrating beyond the TI zone boundaries in all of the impacted areas of the site. It is anticipated that the boundaries of the TI Waiver zones will be drawn considering both the historical plume extent and the information collected during the two year transitional monitoring period, and that the boundaries of the zones will include the areas of the S1 and S2 currently impacted by contamination. Modeling has shown that contaminants are not expected to migrate significantly beyond the current plume boundaries. Based on current data, the plumes appear relatively stable. If groundwater sampling demonstrates that the contaminated plumes, in either the S1 or S2 sands, in any of the impacted areas of the site are not stable or declining, then the contingency measures discussed below will be evaluated, and implemented as appropriate.

The monitoring will be performed in conjunction with the establishment of institutional controls to provide greater assurance that human exposure to contamination above the site's soil and ground water cleanup levels will be prevented. Lyondell Chemical Company, in its draft Institutional Control Plan, identified the following institutional control objectives for all affected properties owned by Lyondell Chemical Company:

- To prevent direct exposure to the affected soils.
 - Eliminate the use of ground water beneath the site.
 - Ensure the continued integrity of the West Road Area slurry wall.
 - Ensure the continued integrity of the Main Waste Area vault.
 - Ensure the continued integrity of the existing vegetative cover.
 - No drinking water wells will be permitted.
 - Provide for site access, site security, periodic inspections, future investigations, remedial actions, soil or ground water sampling, mowing, maintenance, or repair of the structures or equipment necessary to complete the above objectives.
- Access for the above will be allowed for Lyondell Chemical Company, its contractors, US EPA, TCEQ, or successors.

Mechanisms to meet the objectives above include placing the following restrictions in the property deed:

- Excavations or construction from 0 – 4 feet BGS is prohibited except by permit granted by property owner, Lyondell Chemical Company. Notification to Lyondell should be made through a Texas One Call inquiry.
- Excavations or construction, more than four (4) feet BGS is expressly prohibited. Specifically, no excavation or construction will be allowed that might affect the integrity of the West Road Area slurry wall.
- No excavation or construction activities which might affect the integrity of the Main Waste Area vault will be allowed.
- No use of the affected property shall be made which will impair the existing vegetative cover.
- No drinking water wells will be permitted.
- Site access/security will be controlled by a combination of fences, gates, signs, cable guards, and natural barriers. Periodic inspections, ground water monitoring, and maintenance will be performed as required. Signs will be posted at apparent access locations, which indicate that chemicals may exist on the property and that digging and drilling are restricted to protect human health and the environment.

Lyondell Chemical Company, and its successors, shall notify the US EPA, the TCEQ, and/or its successors, of its intent to convey any interest in its site property. Such conveyance shall not be made without prior written approval of the US EPA, the TCEQ, and/or its successors. The property owner and its successors shall consummate no conveyance of title, easement, or other interest in the property without adequate and complete provision for continued maintenance and protection of the affected areas.

In respect to the CR 126 West Area and Bayou Disposal Area, EPEC Polymers, Inc. has initiated contacts with landowners regarding sale or deed restrictions that allow EPEC Polymers Inc. to purchase the properties or ground water rights and/or provide land use restrictions. Potential future exposures would likely be limited road utility workers, trespassers, site maintenance workers and contractors involved in the ground water monitoring program. Restrictions on land use similar to those proposed by Lyondell Chemical Company are expected to be implemented in any portions of the site which may be addressed by EPEC Polymers.

Since the contaminants (at concentrations that preclude unrestricted use) will remain onsite for the foreseeable future, the duration of the institutional controls will be in perpetuity. In addition, long-term actions necessary for the site will include continued monitoring of the ground water.

3.11 Contingency Remedies

If ground water monitoring results indicate that the extent of the ground water contamination is expanding in any of the impacted areas of the site, either in the S1 or the S2 sands, additional studies will be conducted as necessary to develop and evaluate alternative contingent remedial measures that may be required to address the expanding plume, and appropriate additional remedial measures will be implemented. Such contingent measures may include one or more of the following:

- Plugging of wells and installation of replacement wells;
- Monitored natural attenuation;
- Ground water pumping potentially with in situ bioremediation (e.g., via nutrient injection);
- In situ ground water sparging or air stripping;
- The injection of nutrients to enhance natural attenuation;
- Supplemental source assessment, if necessary, followed by additional excavation and/or in situ chemical oxidation to reduce contaminant mass; or
- Installation of a slurry wall, reactive barrier, horizontal grouting, or other containment structure.

The nature of any contingent response to be implemented will be determined based on the rate and contaminant mass that has migrated from the area.

4.0 DESCRIPTION OF SIGNIFICANT DIFFERENCES AND NEW ALTERNATIVES

In the 1998 ROD Amendment, the EPA redefined the previous site boundary of approximately 500 acres to include only the contaminated portions of property and all suitable property in very close proximity to the contamination necessary for implementation of the remedial design and remedial action. The contaminated areas identified in the 1998 ROD Amendment were the West Road Area, the Main Waste Area, the Office Trailer Area, the Easement Area, the Bayou Disposal Area, and CR 126 (formerly known as Frontier Park Road). This redefinition of the site boundary was based upon information available at the time. Since the 1998 ROD Amendment, two additional areas have been identified – the CR 126 West Area and MW-109 Area. Based on how waste was disposed at the site, it is unknown if additional waste disposal areas will be identified in the future. This being the case, the site boundary is reverting to the how it was defined in the 1991 Record of Decision – approximately 500 acres.

This ROD Amendment documents that a Technical Impracticability (TI) determination for restoration of groundwater has been made by EPA. This determination is based on years of remedial activities across the site and two Technical Impracticability demonstrations developed by Lyondell Chemical Company and EPEC Polymers, Inc. The EPA has determined that in areas where significant disposal has taken place, complete restoration of ground water is technically impracticable and that the applicable or relevant and appropriate requirements for ground water restoration will be waived for

designated portions of the site (TI Zones). While the ground water restoration requirements will not apply within the TI Zones, these standards will continue to apply outside the TI Zones. TI Zones will be defined following a two-year transitional monitoring period.

This ROD Amendment identifies a remedy for the CR 126 West Area and revises the remedies previously defined for the Bayou Disposal Area and the Main Waste Area contaminated soils vault. Additionally, the ROD Amendment amends the site's ground water cleanup levels and site's soil cleanup criteria.

4.1 Treatment Components

The remedy for the CR 126 West Area will include the use of augers to mechanically mix the soils in the central disposal area to a depth of 25 feet with chemical oxidant to treat the most affected soils and a portion of the shallow ground water zone (referred to as the S1 zone) and using lime, cement, or fly ash to strengthen the soils. The CR 126 remedy will also use a vapor capture system that will route vapors from the auger mixing to a treatment or adsorption system (such as a thermal oxidizer or activated carbon).

The 1991 ROD and 1998 ROD Amendment did not include a treatment component for the Bayou Disposal Area. This ROD Amendment includes limited excavation of up to 300 cubic yards of contaminated soil and offsite disposal at a permitted facility. Soil excavation will be conducted as necessary to achieve the soil remedial criteria.

In regards to the boundaries of the TI zones, if ground water monitoring results indicate that the extent of the ground water contamination is expanding, additional studies will be conducted as necessary to develop and evaluate alternative contingent remedial measures that may be required to address the expanding plume. Such contingent measures may include one or more of the following:

- Plugging of wells and installation of replacement wells.
- Monitored natural attenuation.
- Ground water pumping potentially with in situ bioremediation (e.g., via nutrient injection).
- In situ ground water sparging or air stripping.
- The injection of nutrients to enhance natural attenuation.
- Additional excavation and/or in situ chemical oxidation to reduce contaminant mass.
- Installation of a slurry wall, reactive barrier, horizontal grouting, or other containment structure.

The EPA recognizes that natural attenuation at the site will contribute to the long-term remedial action objective of maintaining stable or declining contaminated ground water plumes. Ground water monitoring will be required to verify that the ground water

plumes are not expanding and that down-gradient receptors are not impacted. Any contingent response to be implemented will be determined based on the rate and contaminant mass that has migrated from the area.

4.2 Containment or Storage Components

The 1998 ROD Amendment stated, “use of containment components (i.e., caps, slurry walls) may be used as warranted in conjunction with treatment technologies for vertical infiltration control, horizontal migration control, and/or migration control.” This approach is consistent with that outlined in regards to the application of contingency measures to address contaminated ground water migration, if warranted. Potential contingency remedies include the installation of a slurry wall, reactive barrier, horizontal grouting, or other containment structure.

The CR 126 West Area remedy includes the temporary placement of berms around the active remediation area to reduce the amount of storm water to be managed as contact water during soil treatment activities. Hydro-mulch seeding of the disturbed area to provide erosion control is also discussed. The CR 126 West Area remedy also includes using a vapor capture system that will route vapors from the auger mixing to a treatment or adsorption system (such as a thermal oxidizer or activated carbon).

In regards to the Main Waste Area soils containment vault, the 1987 ROD designated that this storage vault would be a temporary containment measure. This ROD Amendment removes the requirement that the vault be dismantled. Instead, the vault will be left in place and monitored and maintained in perpetuity.

In regards to the Bayou Disposal Area, the 1998 ROD Amendment designated that a major component of the remedy was the construction of a graded clay cap planted with select vegetation and developed so as to minimize the infiltration of rain water (i.e., living cap) over the former disposal pit. This ROD Amendment designates that the construction of the graded clay cap is not required. Instead, the remedy will include limited excavation of up to 300 cubic yards of contaminated soil and offsite disposal at a permitted facility. Soil excavation will be conducted as necessary to achieve the soil remedial criteria. In addition, the remedy includes run-off and run-on control and hydro-mulching as may be warranted to address potential erosion.

4.3 Institutional Control Components

Since the 1998 ROD Amendment, a significant change in the site’s current and anticipated land use has occurred for large portions of the site. Specifically, for the site’s West Road Area, Main Waste Area, Office Trailer Area, and Easement Area, residential land use is no longer reasonably anticipated. Lyondell Chemical Company has acquired these properties and will restrict access to these areas such that residential use on this property will not occur. Additional information regarding Lyondell Chemical

Company's institutional control objectives and mechanisms to meet the objectives for all affected properties owned by Lyondell Chemical Company is included in Section 3.10 (Establishment of Technical Impracticability Zones).

In regards to the CR 126 West Area and the Bayou Disposal Area, EPEC Polymers Inc. has initiated contacts with landowners regarding implementing institutional controls through either obtaining property ownership or restrictive covenants for the property necessary to implement the remedy and protect human health and the environment. Restrictions will be pursued that will prohibit the installation of drinking water wells that may contribute to plume movement or result in exposure. The restrictions would also prohibit excavations in the CR 126 West Area without prior approval. These restrictions will be instituted within the areas defined as the CR 126 West and Bayou Disposal Area and to the extent practicable outside of these areas within a distance of 1000 feet. It will not be necessary to purchase all ground water rights or institute ground water use restrictions throughout the target area outside the current plume as long as long-term monitoring is performed since the monitoring will provide an early warning system that ground water use outside of the remediation areas is influencing plume migration. Such monitoring will provide ample time to address the situation before exposure occurs.

Since the contaminants will remain onsite (at concentrations that preclude unrestricted use) for the foreseeable future, the duration of the institutional controls will be in perpetuity.

4.4 Key Applicable or Relevant and Appropriate Requirements (ARARs)

Since the 1998 ROD Amendment, a significant change in the site's current and anticipated land use has occurred for large portions of the site. In consideration of the change in land use for large areas of the site, the following non-residential direct contact (i.e., for 0 – 5 feet below ground surface) soil cleanup criteria have been developed for benzene (36 parts per million – ppm), vinyl chloride (10 ppm), naphthalene (190 ppm), and lead (800 mg/kg). In developing the non-residential direct contact cleanup criteria, the EPA and TCEQ considered both the TCEQ's Tier 1 Commercial/Industrial Soil Protective Concentration Limits (PCLs) and a contaminant specific site worker exposure evaluation.

The soil cleanup criteria identified in the 1991 ROD and 1998 ROD Amendment, based on a residential exposure scenario, remain in effect for residential areas of the site. These soil cleanup criteria are summarized in Section 3.7 (Soil Cleanup Criteria), Table 18 (Soil Remedial Goals).

This ROD Amendment amends the site's ground water contaminant cleanup levels to include levels for vinyl chloride (2 micrograms per liter - µg/L), 1,2-dichloroethane (5 µg/L), cis-1,2-dichloroethylene (70 µg/L), trans-1,2-dichloroethylene (100 µg/L), 1,2-dichloropropane (5 µg/L), 1,1,2-trichloroethane (5 µg/L),

trichloroethylene (5 µg/L), 1,1-dichloroethylene (7 µg/L), styrene (100 µg/L), and toluene (1000 µg/L). These contaminants were detected at elevated concentrations in the CR 126 West Area. These contaminants are not exclusive to the CR 126 West Area, but were in fact found in multiple locations throughout the site. The ground water cleanup levels for these contaminants are their Federal Drinking Water Standards [i.e., Maximum Contaminant Levels (MCLs)]. An MCL is the highest level of a contaminant that EPA allows in drinking water.

Additional contaminants detected at elevated concentrations in the CR 126 West Area are acetone, 1,1-dichloroethane, and tert-butyl alcohol. These contaminants do not have established Federal cleanup criteria for either soil or ground water. The Texas Commission on Environmental Quality (TCEQ) has recommended the following ground water cleanup values for these contaminants: acetone (22,000 µg/L), 1,1-dichloroethane (2,400 µg/L), and tert-butyl alcohol (2,200 µg/L). These TCEQ ground water cleanup values are Texas Risk Reduction Program, Tier One Ground Water Protective Concentration Limits and are recommended when complete site-specific information is not available.

In regards to the Technical Impracticability Zones, the EPA has determined that in areas where significant disposal has taken place, complete restoration of ground water is technically impracticable and that the applicable or relevant and appropriate requirements (ARARs) for ground water restoration will be waived. Additional discussion of the Technical Impracticability determination and establishment of Technical Impracticability Zones can be found in the following Sections 3.1 (Technical Impracticability Determination for Ground Water Restoration), 3.4 (CR 126 West Area Technical Impracticability (TI) Evaluation), 3.5 (Monitor Well (MW) 109 Area Ground Water Data and TI Determination), and 3.10 (Establishment of Technical Impracticability Zones).

The 1998 ROD Amendment identified several ARARs for the site. Because the remedial activities outlined in this ROD Amendment may use the remedial approaches previously defined for the site (i.e., containment, excavation, treatment of contaminated vapor, contaminated water treatment and discharge/disposal, off-site disposal, in-situ treatment), the ARARs previously defined in the 1998 ROD Amendment apply to the remedies defined in this ROD Amendment. Some of the key ARARs identified in the 1998 ROD Amendment are discussed below. Please refer to the 1998 ROD Amendment for a complete discussion of previously identified site ARARs.

The site wastes were examined to determine whether it qualified as RCRA (Resource Conservation and Recovery Act) hazardous waste. The wastes were identified as being RCRA characteristic hazardous waste. Because the wastes are RCRA wastes, RCRA Land Disposal Restrictions (LDRs) are applicable for alternatives that involve removal and placement of contaminated soils (i.e., Bayou Disposal Area excavation and offsite disposal). For alternatives not involving removal and placement, LDRs are not applicable; however, RCRA regulations relating to closure may be relevant and appropriate for alternatives leaving the wastes in place (i.e., Main Waste Area soils

vault). LDRs are not applicable for alternatives that use in-situ treatment (i.e., CR 126 West Area – using augers to mechanically mix soils with chemical oxidant).

National Ambient Air Quality Standards (NAAQS) establishes regulations for specific air pollutants such as benzene, which was determined to be a primary contaminant at the site.

The Clean Air Act, under the regulatory section on Permitting (40 CFR Part 61), requires permits for the discharge of pollutants for point sources, area sources or fugitive emissions. The substantive requirements for a permit will be required for discharge.

The Texas Air Control Board General Rules, specifically 31 TAC Section 101, require compliance with EPA Federal Clean Air Act. The substantive requirements for a permit will be required for all operations. 31 TAC 101.4 prohibits the discharge of air contaminants which may tend to be injurious to or adversely affect human health or welfare, animal life, vegetation or property, or as to interfere with the normal use and enjoyment of animal life, vegetation or property.

Fugitive emissions monitoring, as specified in TACB Regulation V or EPA's New Source Performance Standards (40 CFR 60) or EPA's National Emission Standards for Hazardous Air Pollutants (40 CFR 61) will apply.

Since contaminants will be left on site, the RCRA Closure and Post Closure requirements must be met. CERCLA establishes that remedial actions must be reviewed should contaminants be left on site. Other substantive requirements will be necessary, including monitoring and deed recordation.

RCRA requirements for location of a Treatment, Storage or Disposal facility in a 100-year floodplain, 40 CFR 264.18, and also general requirements for the protection of floodplains, 40 CFR 6, Appendix A, are relevant and appropriate because the site is within the 100-year floodplain.

The National Pollutant Discharge Elimination System (NPDES), 40 CFR Part 125, requires permits for the discharge of pollutants for any point source and storm-water runoff for specific SIC (Standard Industrial Classification) codes into waters of the United States. Substantive requirements for a permit must be met for discharge to a surface water body at the site if on-site ground water treatment occurs and is discharged instead of reinjected.

The Safe Drinking Water Act, Underground Injection Control Regulations (40 CFR Parts 144-147), provides for protection of underground sources of ground water. This will be an ARAR if ground water remediation involves injection to enhance remediation.

The National Primary Drinking Water Standards establish health-based standards for public water systems (maximum contaminant levels – MCLs). MCLs are ARARs at

the site since the affected ground water may be potentially used as a future drinking water source.

Sections of the Clean Water Act and regulations concerning Water Quality Criteria (WQC) and Ambient Water Quality Criteria (AWQC), 40 CFR Part 131, set criteria for water and ambient water quality based on toxicity to human health and toxicity to aquatic organisms, respectively. WQCs and AWQCs for site chemicals are ARARs if the alternative calls for discharge to surface water. Because alternatives will be performed on-site, permits may not be required, but the technical standards of the permit must be met.

Under the State of Texas Rules, Surface Water Quality Standards (31 TAC Sections 307.1 – 307.10), criteria are established for surface water quality and criteria and control procedures for specific toxic substances. These are ARARs if the selected alternative calls for discharge to surface water.

4.5 Remedial Action Objectives

As stated in the 1998 ROD Amendment, a primary goal of the remedial action is to restore shallow ground water to its beneficial use as a potential source of drinking water. Attainment of this goal is dependent upon attainment of the cleanup goals in the contaminated ground water and the reduction of contaminants in the overlying soils. The shallow aquifer is not currently being used as a source of drinking water on site but does have the potential to be used as a drinking water in the future and is considered a class 2-B aquifer. A class 2-B aquifer has water quality such that it is a useable aquifer but for other reasons (i.e., low water yield capacity), it is not currently used.

As discussed in the ROD Amendment (See Sections 3.1 - Technical

Impracticability Determination for Ground Water Restoration, Section 3.4 -CR 126 West Area Technical Impracticability (TI) Evaluation, and Section 3.10 - Establishment of Technical Impracticability Zones), restoration of the impacted ground water and overlying soils has been determined to be technically impracticable. This being the case, the above stated remedial object has been modified as follows:

- For areas designated as Technical Impracticability Zones (see Section 3.10 – Establishment of Technical Impracticability Zones), the remedial action objective is to maintain stable or declining contaminated ground water plumes and to prevent exposure to contaminants exceeding this ROD Amendment's soil and ground water cleanup criteria.
- For areas outside the designated Technical Impracticability Zones, the remedial action goal is to protect the ground from degradation from site contaminants thereby maintaining its beneficial use as a potential future source of drinking water.

Ground water contaminations may be especially persistent in the immediate vicinity of the contaminants' source, where concentrations are relatively high. The ability to achieve remedial levels at all points throughout the site including the CR 126 West Area's affected ground water plumes has been determined to be technically impracticable. However, a remedial strategy that is technically practicable, protective of human health and the environment, and effects partial remediation of the source area in the CR 126 West Area has been selected. In addition, the remedy includes institutional controls to limit ground water use within the affected strata, ground water monitoring to assess whether the affected ground water plumes are expanding, and contingent response actions if the ground water plumes were to expand or increase in concentration. If contingency measures constitute a significant or fundamental change to what is discussed in this ROD Amendment, an Explanation of Significant Differences (ESD) or subsequent ROD Amendment will be required. Changes to the remediation goals (i.e., performance standards) would constitute a fundamental change and would require a ROD Amendment.

In regards to the Main Waste Area's vault and the West Road Area's slurry wall, the remedial action goal is to monitor and maintain these structures to prevent direct contact and contaminant migration.

In regards to the soil cleanup criteria, the remedial objective is to attain the appropriate remediation levels (residential or non-residential), based on the current land use.

4.6 Changes in Expected Outcome

As discussed previously, the designation of Technical Impracticability Zones across the site will result in the waiving of applicable or relevant and appropriate requirements for ground water restoration. Soil cleanup levels defined for the direct contact exposure (residential and non-residential) will remain in effect across the site and within the designated Technical Impracticability Zones. Outside the Technical Impracticability Zones, all the cleanup goals apply.

Since the 1998 ROD Amendment, a significant change in the site's current and anticipated land use has occurred for large portions of the site. Specifically, for the site's West Road Area, Main Waste Area, Office Trailer Area, and Easement Area, residential land use is no longer reasonably anticipated. Lyondell Chemical Company has acquired these properties and will restrict access to these areas such that residential use on this property will not occur. In regards to the CR 126 West Area and the Bayou Disposal Area, EPEC Polymers Inc. has initiated contacts with landowners regarding sale or deed restrictions that allow EPEC Polymers Inc. to purchase the properties or ground water rights and/or provide land use restrictions. Potential future exposures would likely be limited road utility workers, trespassers, site maintenance workers and contractors involved in the ground water monitoring program.

In consideration of the change in land use for large areas of the site, the following non-residential direct contact (i.e., for 0 – 5 feet below ground surface) soil cleanup criteria have been developed for benzene (36 parts per million – ppm), vinyl chloride (10 ppm), naphthalene (190 ppm), and lead (800 mg/kg). In developing the non-residential direct contact cleanup criteria, the EPA and TCEQ considered both the TCEQ's Tier 1 Commercial/Industrial Soil Protective Concentration Limits (PCLs) and a contaminant specific site worker exposure evaluation.

5.0 EVALUATION OF ALTERNATIVES

The US EPA uses nine criteria, or standards, to evaluate alternatives for addressing a Superfund site. These nine criteria are categorized into three groups: threshold, primary balancing, and modifying. The threshold criteria must be satisfied in order for an alternative to be eligible for selection. The primary balancing criteria are used to weigh major tradeoffs among alternatives. The modifying criteria are taken into account after public comment is received on the Proposed Plan of Action. The nine criteria used in evaluating all of the alternatives after public comment are discussed below.

Threshold Criteria

Overall Protection of Human Health and the Environment

This criterion addresses the way in which a potential remedy would reduce, eliminate, or control the risks posed by the site to human health and the environment. The methods used to achieve an adequate level of protection may be through engineering controls, treatment techniques, or other controls such as restrictions on the future use of the site. Total elimination of risk is often impossible to achieve. However, a remedy must minimize risks to assure that human health and the environment are protected.

Compliance with Applicable or Relevant and Appropriate Requirements

Compliance with ARARs assures that a selected remedy will meet all related Federal, State, and local requirements. The requirements may specify maximum concentrations of chemicals that can remain at the site; design or performance requirements for treatment technologies; and restrictions that may limit potential remedial activities at a site because of its location.

Primary Balancing Criteria

Long-term Effectiveness and Permanence

This criterion addresses the ability of a potential option to reliably protect human health and the environment over time, after the remediation goals have been accomplished.

Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment

This criterion assesses how effectively a remedy will address the contamination problem. Factors considered include the nature of the treatment processes; the amount of hazardous materials that will be destroyed by the treatment process; how effectively the process reduces the toxicity, mobility, or volume of waste; and the type and quantity of contamination that will remain after treatment.

Short-term Effectiveness

This criterion assesses the time factor. Remedies often require several years for implementation. A potential remedy is evaluated for the length of time required for implementation and the potential impact on human health and the environment during implementation.

Implementability

This criterion addresses the ease with which a potential remedy is put in place. Factors such as availability of materials and services are considered.

Costs

This criteria includes capital costs required for design and construction, and projected long-term maintenance costs. Cost is considered and compared to the benefit that will result from implementing the remedy.

State Acceptance

This criterion addresses state concerns, comments on ARARs, and concurrence or lack of concurrence on the selected remedy.

Community Acceptance

During the 30-day public comment period, interested persons for organizations were provided the opportunity to comment on the Proposed Plan. The US EPA considered these comments in making its final selection. The comments are addressed in a document called a responsiveness summary, which is included as Appendix B in this Amended ROD.

5.1 Overall Protection of Human Health and the Environment

This ROD Amendment expands the scope of the remedial action to include the CR 126 West Area. The remedy reduces the overall risk in the CR 126 West Area via removal or in-situ treatment of the most contaminated soils and the in-situ treatment contaminated ground water. For the Bayou Disposal Area, limited excavation of up to 300 cubic yards of contaminated soil and off-site disposal at a permitted facility is the amended remedy. Soil excavation will be conducted as necessary to achieve the soil remedial criteria. For areas designated as technical impracticability zones, land use restrictions will be required to prevent degradation of the site's existing containment structures (i.e., West Road Area slurry wall, Main Waste Area contaminated soils vault), prevent exposure to contaminated ground water, and prevent exposure to contaminated soils. Ground water monitoring will occur to ensure that there is no unacceptable risk to down-gradient receptors. This combination of contaminated source area treatment, restrictions on land use, and long-term maintenance and monitoring will ensure that human health and the environment are protected.

5.2 Compliance with Applicable or Relevant and Appropriate Requirements

The amended remedy will be performed in full compliance with all location and action-specific ARARs and other criteria, advisory, guidelines that are applicable or considered relevant and appropriate, except as noted. For areas designated technical impracticable zones, chemical specific ARARs (i.e., MCLs and soil cleanup criteria set for protection of ground water) will be waived. For all areas outside the technical impracticability zones, all chemical-specific ARARs will be attained.

In regards to the verification of soil performance standards, sufficient data must be presented to document whether soil chemical concentrations are statistically below a cleanup standard or ARAR. If it can be reasonably concluded that the remaining soil or treated soil at a site has concentrations that are statistically less (e.g., utilizing a 95% confidence level) than the relevant cleanup standards then the site can be judged to be protective of human health and the environment. EPA's guidance document, *Methods for Evaluating the Attainment of Cleanup Standards Volume 1: Soils and Solid Media* (EPA 230/02-89-042, February 1898), describes methods for testing whether soil chemical concentrations at a site are statistically below a cleanup standard or ARAR.

As stated previously, this ROD Amendment amends the site's soil cleanup criteria to address a non-residential exposure scenario (based on a change in land use) and includes additional ground water contaminant cleanup levels (i.e., MCLs) for vinyl chloride, 1,2-dichloroethane, cis-1,2-dichloroethylene, trans-1,2-dichloroethylene, 1,2-dichloropropane, 1,1,2-trichloroethane, trichloroethylene, 1,1-dichloroethylene, styrene, and toluene. TCEQ's recommended ground water cleanup criteria for acetone, 1,1-dichloroethane, and tert-butyl alcohol are noted.

5.3 Long-term Effectiveness and Permanence

The site's remedy will provide for long-term effectiveness and permanence through treatment of the most contaminated soils and a portion of the shallow ground water in the CR 126 West Area. Contaminated soils from the Bayou Disposal Area will be excavated as necessary to achieve the soil remedial criteria and taken off-site for disposal. The use of containment remedy components can provide additional effectiveness, as long as maintenance of the containment components is continued. Institutional controls will be effective as long as they are maintained and enforced to prevent exposure to contaminated soils and ground water. Long-term ground water monitoring will be conducted to ensure the remedy remains effective.

5.4 Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment

The remedy includes the use of augers to mechanically mix the soils in the central portion of the CR 126 West Area to a depth of 25 feet with chemical oxidant to treat the most affected soils and a portion of the shallow ground water zone (referred to as the S1 zone) and using lime, cement, or fly ash to strengthen the soils. Contaminated-laden vapors generated during the CR 126 West Area soil treatment activities will be captured and treated to the extent necessary to achieve the emission performance standards/limits. Contaminated soil in the Bayou Disposal Area will be excavated as necessary to achieve the soil remedial criteria and taken offsite for disposal at a permitted facility. The EPA recognizes that natural attenuation at the site will contribute to the long-term remedial action objective of maintaining stable or declining contaminated ground water plumes. Ground water monitoring will be required to verify that the ground water plumes are not expanding and that down-gradient receptors are not impacted.

5.5 Short-term Effectiveness

The estimated time required to implement the CR 126 West Area and Bayou Disposal Area remedies is 18 months. A more accurate estimate of the time required to implement the CR 126 West Area and Bayou Disposal Area remedies will be developed as part of the remedial design.

In-situ remedies do not require excavation of contaminated soils and are favored over remedy components that require excavation. This is due to the increased potential for worker accidents during excavation activities as well as the potential for fugitive emissions resulting during the excavation of soils containing volatile contaminants (i.e., vinyl chloride, benzene). Excavation of hot spots will occur in the Bayou Disposal Area as necessary to achieve the soil remedial criteria.

Occupational Safety and Health Administration (OSHA) Regulations shall be followed for all site activities. Community protection will be provided by using air quality monitoring and engineering controls (i.e., vapor capture techniques) to address air emissions produced by on-site treatment process and any excavations activities. Dust control may also be necessary during any excavation and can be accomplished with water or foam sprays.

5.6 Implementability

Bench scale testing and a Mechanical Auger Mixing (MAM) In Situ Chemical Oxidation (ISCO) feasibility demonstration (aka pilot test) have been conducted to evaluate the implementability of the CR 126 West Area remedy.

Prior to conducting the pilot test, Environmental Resources Management, on behalf of EPEC Polymers, Inc., conducted an extensive literature search to assess the applicability of ISCO and to determine which of the oxidants on the market today would be the most effective at treating the site contaminants found in the shallow soils and ground water at the site. Based on the literature search, several studies were found that identified sodium persulfate as the oxidant that would be most effective at treating the site contaminants. Two of the primary sources utilized include:

- Philip A. Block, Ph. D., Richard J. Watts, Ph. D., Any L. Teel, Ph. D., Richard A. Brown, Ph. D.: An Examination of Persulfate Activation and Reactivity, presented at the fourth International Conference on Oxidation and Reduction Technologies for In-Situ Treatment of Soil and Groundwater Marriott Chicago O'Hare, Chicago, Illinois, USA.
- Richard Brown, George Skladany, David Robinson, Joe Fiacco, John McTigue: Comparing Permanganate and Persulfate Treatment Effectiveness for Various Organic Contaminants, presented at The First International Conference on Oxidation and Reduction Technologies for In-Situ Treatment of Soil and Groundwater (ORTS-1) Niagara Falls, Ontario, Canada, June 25-29, 2001.

Based on these studies, extensive bench-scale testing was conducted using samples of the site soil and ground water to assess the effectiveness of the persulfate on treating the site contaminants in each media. Other oxidants, including percarbonate, were used to compare the effectiveness of the treatment. In addition, the bench-scale testing evaluated the use of cement mixing to stabilize the effects of the soil mixing process on volatilization.

The results of the bench scale studies showed that the persulfate was more effective than other oxidants at treating the site-specific contaminants. While the reaction rate using persulfate was slower for some compounds (several days), the rates for reducing benzene and vinyl chloride to non-detects were relatively rapid (a few hours). Persulfate also proved to be more persistent than percarbonate, lasting several days. The

percarbonate was used up very rapidly, making it ineffective for treating the slower reacting compounds.

The use of cement in the mixture appeared to reduce the leachability of the volatile organic compounds and did not appear to affect the oxidation reaction. The soil mixing process does induce volatilization. The injection of the oxidant did not appear to affect the volatilization. However, the cement did appear to have an affect on the volatilization rate for some compounds (e.g., 1,1-dichloroethane).

The purpose of the MAM ISCO field pilot study was to demonstrate the feasibility of this remediation technique and to provide information for preparing full-scale remediation specifications. The remediation technique uses a specialized auger rig that is capable of mixing oxidant and water with the site's contaminated clayey soils as it augers through them to create the treated soil slurry.

The field pilot study demonstrated that the mechanical auger mixing technique is effective at liquefying the clayey soil and achieving a small clod size (i.e., less than 1 to 2 inches); is capable of auger mixing to a depth of 25 feet in a reasonable time; and is capable of injecting a chemical oxidant solution. The treated soil slurry created by soil mixing can be amended with lime, cement or fly ash to restore its bearing strength and vapors from the technique can be controlled via available control technologies

The MAM ISCO involved injection of different mixtures of chemical oxidants into the soil that was broken into fine particles by a large diameter (i.e., 6 foot) auger. Analytical results indicate that injection of persulfate as the oxidant can destroy in practice up to 80% of the contaminants in the ground water and soil. This estimate is based on bench-scale tests that demonstrate over 90% destruction of the most predominant contaminants in a laboratory setting and on pilot testing that demonstrated nearly 100% destruction after treatment.

The necessary materials and services required to implement the excavation remedy in the Bayou Disposal Area readily available.

5.7 Costs

The estimated cost to implement the CR 126 West Area (as presented in the *County Road 126 West Area Remedial Action Plan* (ERM, March 1, 2006)) is approximately \$7,800,000. The estimated cost to implement the Bayou Disposal Area (as presented in the *Bayou Disposal Area Removal Action Plan* (ERM, March 1, 2006)) is approximately \$950,000.

For the West Road Area, Main Waste Area, Office Trailer Area, and Easement Area, it has been estimated that it would take up to 160 years and an additional \$80,625,000 to reach the ground water cleanup criteria with continued operation the site's remedial system. Other potential technologies were evaluated and determined to be not

viable due primarily to the volume of contaminated soils and the inability to remove the remaining contamination from the site's clay and silt soils. The remedial operation, having reached its technological limits, has been shut-down. The affected property has been acquired by Lyondell Chemical Company and is being evaluated to determine if monitored natural attenuation is sufficient to prevent plume expansion. The property has been fenced and restrictions are being placed on the property to prevent exposure to the remaining contaminants.

5.8 State Acceptance

The State's concurrence letter on this ROD Amendment is attached.

5.9 Community Acceptance

The US EPA recognizes that the community in which a Superfund site is located is the principal beneficiary of all remedial actions undertaken. The US EPA also recognizes its responsibility to inform the local community of the nature of Superfund environmental problems and solutions, and to learn from the community what its desires are regarding these sites. The Amended Proposed Plan of Action was released for public comment in April 12, 2006. The public comment period began on April 12, 2006 and ended on May 12, 2006. A public meeting was held on April 27, 2006 at the Calvary Baptist Church located at the corner of FH 563 and County Road 129 (aka Liberty Heights) to provide the local community an opportunity to provide verbal and/or written comments on the Amended Proposed Plan of Action. The Calvary Baptist Church is located approximately one mile north of the site off FM 563.

A court reporter was present to record a transcript of the meeting. Verbal questions asked at the public meeting were in regards to the potential for health impacts, requests for residential well sampling, the potential for contaminant migration by way of storm water runoff, impacts on property values, maintenance of CR 126, and a number of other topics. During the 30-day public comment period, five sets of written comments were received. The questions received during the 30-day public comment period and the US EPA's responses to these questions are provided in the Responsiveness Summary (Appendix B).

6.0 SUPPORT AGENCY COMMENTS

The Texas Commission on Environmental Quality (TCEQ) provided comments on the Amended Proposed Plan in a letter dated April 25, 2006. These comments and EPA's responses to these comments are provided in the Responsiveness Summary. TCEQ's comments focused on the technical impracticability (TI) waiver. The following is summary of TCEQ's comments and EPA's responses:

- TCEQ requested that the Proposed Plan be amended to make it clearer that the TI waiver process is intended to apply at numerous locations across the site. This ROD Amendment has been written to clarify this point.
- TCEQ stated that the Proposed Plan did not accurately summarize the TCEQ's understanding of performance requirements that are to apply to groundwater within TI zones and the manner in which such zones will be designated. This ROD Amendment clarifies that prior to defining the TI ground water zones, a two-year transitional monitoring period will occur. The information gather during the two years and consideration of the historical plume boundaries will be used in determining the boundaries of the TI Waiver zones. If the monitoring results indicate that the extent of ground water contamination is expanding, additional studies may be performed as necessary to develop and evaluate alternative contingent remedial measures that may be required.
- TCEQ stated that while its Texas Risk Reduction Program (TRRP) rules are sufficiently flexible for Class 2 ground water to approve a response similar to the type that EPA is proposing, there are significant data gaps regarding the degree NAPL and natural attenuation parameter data. Please note that for the CR 126 West Area, numerous investigations have been by conducted by Lyondell Chemical Company, EPEC Polymers, and by the EPA over the past six years. The soil concentrations present today indicate that there are no recoverable free non-aqueous phase waste liquids, but it is evident based on the shallow ground water concentrations that residual waste constituents remain adsorbed as thin films on the clay and silt that are the predominant soil within the shallow water bearing zone. Following active remediation in this area, two years of transitional monitoring will be conducted to confirm plume conditions and evaluate natural attenuation. For the West Road Area, Main Waste Area, Office Trailer Area, and Easement Area, for over 15 years ARCO Chemical Company (which was purchased in 1999 by Lyondell Chemical Company) has been conducting investigations and remediation activities in these areas. They have installed hundreds of wells and taken literally tens of thousands of soil and groundwater samples. From 1997 until 2005, they had several fulltime contractors onsite conducting active remediation using several technologies. While NAPL may be present in localized areas of the site, NAPL has never been observed in any of the wells. Any concerns about plume migration will be addressed by Lyondell's transition monitoring. This effort involves over 140 wells and is intended to both confirm the plume conditions (i.e., establish baselines) and evaluate the natural attenuation processes. For the Bayou Disposal Area, NAPL has ever been suspected based on the numerous soil investigation activities and several years of ground water monitoring.
- TCEQ requested that EPA require that during the two-year transitional period, data be collected to evaluate whether natural attenuation will be effective over time in preventing plumes within the S1 sand unit from migrating beyond the TI zone boundaries and in allowing the S2 sand unit performance objectives to be attained. A monitoring network

will collect contaminant, hydrogeologic and geochemical parameters for evaluation during the transition period. The primary monitoring objective will be to demonstrate that the plumes are stable or declining in nature and that there is no risk to receptors. The monitoring will be performed in conjunction with the establishment of institutional controls to prevent human exposure to contamination exceeding the site's soil and groundwater cleanup goals.

7.0 STATUTORY DETERMINATIONS

The US EPA's primary responsibility at Superfund sites is to select remedial actions that are protective of human health and the environment. Section 121 of CERCLA also requires that the selected remedial action for the site comply with applicable or relevant and appropriate environmental standards established under Federal and State environmental laws, unless a waiver is granted. The selected remedy must also be cost effective and utilize permanent treatment technologies or resource recovery technologies to the maximum extent practicable. The statute contains a preference for remedies that include treatment as a principal element. The following sections discuss how the amended remedy at the site meets the statutory requirements.

7.1 Protection of Human Health and the Environment

In order to protect human health and the environment, augers will be used to mechanically mix the soils in the central disposal area of the CR 126 West Area to a depth of 25 feet with a chemical oxidant to treat the most affected soils and a portion of the shallow ground water zone (referred to the S1 zone) and using lime, cement, or fly ash to strengthen the mixed soils. In the site's Bayou Disposal Area, limited excavation of up to 300 cubic yards of contaminated soil with offsite disposal at a permitted facility will be conducted as necessary to achieve the soil remedial criteria. A determination has been made that attainment of the site's remedial action goals is technically impracticable for areas of the site. In these areas, restrictions are being placed to restrict access and prevent activities that could result in potential exposure to contaminants. A ground water monitoring program will be implemented to ensure site ground water plumes are not expanding and downgradient receptors are not impacted. If the plumes are expanding, additional contingency measures may be implemented to ensure protection of human health and the environment. No unacceptable short-term risks or cross-media impacts will be allowed during the implementation of the amended remedy.

7.2 Attainment of Applicable or Relevant and Appropriate Requirements of Environmental Laws

The amended remedy will be performed in full compliance with all location and action-specific ARARs and other criteria, advisory, and guidelines that are applicable or considered relevant and appropriate. For areas designated technical impracticable zones,

chemical specific ARARs (i.e., MCLs and soil cleanup criteria set for protection of ground water) will be waived. Chemical specific ARARs developed for direct contact soil exposure will be addressed to prevent exposure. For all areas outside the technical impracticability zones, all ARARs will be attained.

7.3 Cost Effectiveness

The US EPA believes that the CR 126 West Area remedy is cost-effective in reducing the contaminant mass in the source area. The remedial approach for the CR 126 West Area will involve the in-situ treatment of the most affected soils and a portion of the shallow ground water zone. In the site's Bayou Disposal Area, limited excavation of up to 300 cubic yards of contaminated soil with offsite disposal at a permitted facility will be conducted as necessary to achieve the soil remedial criteria. Section 300.430(f)(ii)(D) of the NCP requires the US EPA to determine cost-effectiveness by evaluating the following three of the five balancing criteria to determine overall effectiveness: long-term effectiveness and permanence; reduction of toxicity, mobility or volume through treatment; and short-term effectiveness. Overall effectiveness is then compared to cost to ensure that the remedy is cost effective. The estimated remedy cost for the CR 126 West Area (as presented in the *County Road 126 West Area Remedial Action Plan* (ERM, March 1, 2006)) is approximately \$7,800,000. The estimated cost for the CR 126 West Area remedy (as presented in the *Bayou Disposal Area Removal Action Plan* (ERM, March 1, 2006)) is \$950,000.

7.4 Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies

The US EPA believes the amended remedy includes to the maximum extent practical permanent solutions and treatment technologies that can be utilize in a cost-effective manner for the site. The US EPA is certain that the amended remedy will provide the best balance in considering long-term effectiveness and permanence; reduction in toxicity, mobility or volume through treatment; short-term effectiveness; implementability; and cost, as well as considering statutory preference for treatment as a principal element and considering State and community acceptance.

The Amended ROD's remedial treatment technologies, in combination with appropriate containment components, complies with ARARs and reduces the toxicity, mobility, and volume of the contaminants in the site's CR 126 West Area soils and ground water and the Bayou Disposal Area soils. The in-situ aspect of the CR 126 West Area remedy was critical in choosing this alternative based on estimated volume of contaminated soils and ground water requiring remedial action and the volatile nature of the site's contaminants. The short-term effectiveness and protection of human health and the environment to will be satisfied by the amended remedy.

7.5 Preference for Treatment as a Principal Element

The amended remedy will satisfy the statutory preference for treatment as a principal element. The primary risk to human health is from ingestion of and direct contact with contaminated ground water. The amended remedy reduces levels the site contaminants in the CR 126 West Area through treatment (in-situ chemical oxidation). The Bayou Disposal Area contaminated soil will be excavated and taken off-site for disposal as necessary to achieve the soil remedial criteria. The contaminant-laden vapor captured during the soil mixing activities in the CR 126 West Area will be treated by the appropriate air pollution control equipment.

Because the amended remedy will result in hazardous substances remaining on site, a review of the CR 126 West Area and Bayou Disposal Area will be included as part of the site's five-year review. The next five-year review is scheduled for 2010. A primary goal of the five-year review is to ensure that the remedy continues to provide adequate protection of public health, welfare and the environment.

8.0 PUBLIC PARTICIPATION

Pursuant to the National Contingency Plan §300.435(c)(2)(ii), the following public participation requirements have occurred:

- A notice of the availability of the of the Proposed Plan and the Administrative Record was published in a local newspaper of general circulation – *The Vindicator*, on Wednesday, April 12, 2006. The newspaper notification also announced the start of the public comment period and provided the location and date for a public meeting. In addition, a similar notification was placed on the Internet at www.i-dineout.com on April 12, 2006. EPA's Remedial Project Manager was informed by local citizens that they often check the i-dineout website for local information. The notification remained on the website until the end of the public comment period.
- The public comment period started on April 12, 2006 and ended on May 12, 2006. On April 27, 2006, a public meeting was held at the Calvary Baptist Church located about one mile north of the site at the intersection of Farm-to-Market Road 563 and County Road 129. The purpose of the meeting was to discuss the major components of the Amended Proposed Plan of Action and to provide the local community an opportunity to provide verbal and written comments on the Amended Proposed Plan of Action. In addition to U.S. EPA personnel, Texas Commission on Environmental Quality personnel, and the court reporter, 43 persons attended the public meeting.
- A full account of the public meeting can be found in the public meeting transcript. The transcript is included in the Administrative Record for this ROD Amendment.

- The EPA received several oral comments during the public meeting as well as three Comment Sheets from local residences. Written comments on the Amended Proposed Plan were also provided by the Texas Commission on Environmental Quality and EPEC Polymers, Inc. A Responsiveness Summary has been prepared to provide written responses to comments received on the EPA's Amended Proposed Plan of Action. The Responsiveness Summary is provided as Appendix B of this ROD Amendment.

This ROD Amendment will become part of the Administrative Record for the site and will be made available to the public. Notice of availability of the Amended ROD will be published in a local newspaper of general circulation.

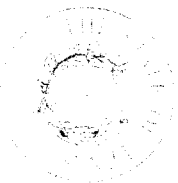
RECORD OF DECISION AMENDMENT

**PETRO-CHEMICAL SYSTEMS, INC.
(TURTLE BAYOU)
SUPERFUND SITE**

**REGION 6
SEPTEMBER 2006**

APPENDIX A

Kathleen Hartnett White, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
Larry R. Soward, *Commissioner*
Glenn Shankle, *Executive Director*



RECEIVED
2006 OCT -5 PM 2:50
AIR/QUALITY BRANCH

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

October 3, 2006

Mr. Samuel Coleman, P.E., Director
Superfund Division
U.S. Environmental Protection Agency Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202

RECEIVED
2006 OCT -3 PM 2:50
AIR/QUALITY BRANCH

Re: Record of Decision Amendment
Petro-Chemical Systems Superfund Site TXD980873350
Liberty, Liberty County, Texas

Dear Mr. Coleman:

The Texas Commission on Environmental Quality (TCEQ) received your final Superfund Record of Decision (ROD) Amendment for the Petro-Chemical Systems Superfund Site in Liberty, Texas, on September 22, 2006. The TCEQ has completed review of the above referenced document and concurs with all modifications to the previous 1991 ROD and the 1998 ROD Amendment, as presented.

The ROD documents that a Technical Impracticability (TI) determination for restoration of portions of the groundwater at the site (the S1 sand and the deeper S2 sand) has been made for the site and the exact boundaries of the TI Zones will be established after a two-year transitional monitoring period. The ROD identifies contingency remedies for the site in the event that future groundwater monitoring demonstrates that the plumes of contaminated groundwater are expanding beyond the TI boundary in either the S1 or S2 sand.

Sincerely,

Glenn Shankle
Executive Director

LV/v



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011319

RECORD OF DECISION AMENDMENT

PETRO-CHEMICAL SYSTEMS, INC.

(TURTLE BAYOU)

SUPERFUND SITE

REGION 6

SEPTEMBER 2006

APPENDIX B

**PETRO-CHEMICAL SYSTEMS, INC. (TURTLE BAYOU) SITE
AMENDED RECORD OF DECISION
RESPONSIVENESS SUMMARY**

This Responsiveness Summary has been prepared to provide written responses to comments received on the U.S. Environmental Protection Agency's (EPA's) Amended Proposed Plan of Action. The summary is divided into two sections.

Section I Background of Community Involvement and Concerns

This section provides a brief history of the community interest and concerns in relation to the Petro-Chemical Systems, Inc. (Turtle Bayou) Superfund site (site). There has been a long history of citizen awareness of the site. In 1971, when an application was made with the State of Texas for a commercial industrial waste disposal permit in the name of Petro-Chemical Systems, Inc., local citizens organized to oppose the application. Due in part to the community's opposition to the permit, State approval of the permit was withheld and the permit was eventually withdrawn in 1974. More recently, with the exception of site property owners and residents living on and adjacent to the site, community interest has been low. The low general community interest is probably due in part to the site's rural location.

Section II Summary of Major Comments

The public comment period started on April 12, 2006 and ended on May 12, 2006. Public notice announcing the start of the public comment period and the public meeting was published in *The Liberty Vindicator* on Wednesday, April 12, 2006. In addition, a public notification of the public comment period and public meeting was placed on the Internet at www.i-dineout.com on April 12, 2006. EPA's Remedial Project Manager was informed by local citizens that they often check the i-dineout website for local information. The notification remained on the website until the end of the public comment period. On April 21, 2006, a meeting flyer was mailed out to all parties on the site's mailing list. On April 27, 2006, the public meeting was held at the Calvary Baptist Church located about one mile north of the site at the intersection of Farm-to-Market Road 563 and County Road 129. The purpose of the meeting was to discuss the major components of the Amended Proposed Plan of Action and to provide the local community an opportunity to provide verbal and written comments on the Amended Proposed Plan of Action. In addition to U.S. EPA personnel, Texas Commission on Environmental Quality personnel, and the court reporter, 43 persons attended the public meeting.

The EPA received several oral comments during the public meeting as well as three Comment Sheets from local residences. Written comments on the Amended Proposed Plan were also provided by the Texas Commission on Environmental Quality and EPEC Polymers, Inc. Comments pertinent to EPA's Amended Proposed Plan of Action are summarized below, followed by EPA's response. A full account of the public meeting

can be found in the public meeting transcript. The public meeting transcript is included in the site's Administrative Record for this Amended ROD.

COMMENTS RECEIVED AT THE PUBLIC MEETING:

1. Unidentified Speaker
“When you say groundwater, you’re talking about rains that come down onto the ground and flow across the properties?”

EPA Response
Rain water that flows across the ground is referred to as surface water or storm water. Ground water refers to water found beneath the ground surface that fills pores between soil, sand, and gravel particles to the point of saturation. When it occurs in a sufficient quantity, ground water can be used as a water supply.

2. Unidentified Speaker
“So, you’re saying it [contamination] only goes down to 30 feet?”

EPA Response
The vast majority of contamination at the site is located within 30 feet of the ground surface. For example, in the site's Far West Road Area, it has been estimated that over 99% of the contaminant mass is present within 30 feet of the ground surface.

3. Mr. Ted Bennett
“What does plume mean?”

EPA Response
In regards to ground water, a plume is measurable concentration of a contaminant from a given point of origin. In air, a plume can be visible (e.g., plume of smoke).

4. Ms. Stephanie Chaplain
“How much natural bioremediation is occurring?”

EPA Response
In an effort to determine how much natural bioremediation is occurring, a two year ground water sampling program is underway for portions of the site. The goal of the sampling program is to gain a better understanding of natural biodegradation processes occurring in the ground water and its effect on overall contaminant mass reduction. Sampling is scheduled to take place on a quarterly basis for two years. To date, two rounds of sampling have occurred.

5. Unidentified Speaker
“When we flood out there [at the site], is there a chance those flood waters might move some of that [contamination]?”

EPA Response
Flood waters certainly can provide a mechanism for transport of contaminants. In fact, when waste was initially disposed at the site in the late 1960s to mid-1970s, flood waters could have provided a means of mobilizing waste. However, what has been found at the site based on years of sampling is that waste that remains at the site is primary found at depth and not right at the surface.

6. Mr. Mark West
“When they were dumping down in there, what’s to say they couldn’t have come all the way down in there and dumped?”

EPA Response
Since the site was never an authorized waste disposal facility, the exact nature of the disposal activities at the site is uncertain. However, based on years of investigations, years of sampling soil and water, and other information gathered over the years, several areas where waste was disposed have been identified. If new areas are identified, EPA will continue in our efforts to address these areas.

7. Ms. Cheryl Bennett
“What year was the EPA aware that all these chemicals may have been dumped out here?”

EPA Response
In May 1984, the State of Texas, represented by the Texas Department of Water Resources, requested that the Petro-Chemical Systems, Inc. Site be included on the National Priority List (NPL) (i.e., list of Superfund sites). In August 1984, the EPA sent personnel to collect soil samples along Frontier Park Road (now County Road 126) and a large pit in the Main Waste Area. The site was proposed for addition to the NPL in 1984, and was finalized on the NPL in June 1986.

8. Mr. Ted Bennett & Ms. Cheryl Bennett
“How come people were not notified (i.e., in the late 1970s) when they bought the property that chemicals were disposed out there?”

EPA Response
The EPA is not aware of the reason why the seller did not disclose information about the property.

9. Mr. Donnie Taylor

“You told me several years ago you would give anybody an environmental impact statement on this land, that there was nothing there. Are you still saying that you will give anybody on any piece of land out there an environmental impact statement?”

EPA Response

Environmental impact statements are reports that outline the predicted environmental effects of a particular action in which the federal government is involved. Environmental impact statements of a necessary or projected activity highlight the significant environmental ramifications of a proposed project, outlines in detail the proposed actions, alternative actions (including no action), and their probable environmental ramifications.

Environmental assessments (Phase I) are reports that comply with the American Society of Testing & Materials Standard E-1527-05 (Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process). These reports are routinely required by lenders as part of a real estate transaction. These reports include an evaluation of the property and conclusions regarding the presence or potential presence of environmental liabilities at the subject property.

The EPA does not provide these environmental assessments. The EPA can provide landowners the information that is publicly available as part of the site file.

10. Mr. Marvin Smith

How far west of 563 have you tested?

EPA Response

Limited sampling west of FM 563 has taken place primarily within the FM-563 right-of way (i.e., within 40 feet of the center-line of FM 563).

11. Ms. Lydia Davis

Ms. Davis asked if surface water sampling has been conducted and if so, how recently. Ms. Davis stated that surface water from the west end of the site runs right down the ditch on CR 126, comes under the road and runs down CR 127 and ends up in front of her property. She also mention that they have a 38-foot deep well.

EPA Response

As part of the numerous investigations and sampling activities that have occurred at the site over the years, surface water samples have been collected. The

following information was taken from the *Remedial Investigation Report Volume IV – Risk Assessment* (Texas Water Commission, November 1990).

Section 2.2.2.3 Surface Water

Detailed descriptions of surface features, surface waters and sampling activities are presented in the RI (LAN, 1990). Intermittent streams and ditches convey surface drainage from the site to Turtle Bayou. Although the site is generally flat and many chemicals are relatively immobile, surface water sampling was conducted at the site. Five surface water samples were analyzed from the MWA [Main Waste Area], four from the EDA [East Disposal Area], and three from the BDA [Bayou Disposal Area]. Tables 2-10 through 2-12 present the analytical results from this sampling effort.

In is important to note that these sampling activities were conducted prior to any cleanup activities occurring in these areas. The area designated the East Disposal Area encompasses to the east the area currently defined as the Easement Area. Two of the four surface water samples in the East Disposal Area were collected along the Gulf State Utility Easement south of CR 126.

The results of the surface water sampling were summarized in Section 4.2.3 of the Risk Assessment. The sampling activities indicated that organic compounds were not detected in the Bayou or in other surface waters in the MWA and EDA. It is unlikely that surface water on the site would be used for human consumption, although water on the site would be used for by wildlife. No chemicals were detected in Phase 1 surface water samples from the site; therefore, no significant human or wildlife exposures from ingestion, inhalation, or dermal contact are expected presently or in the future.

On June 28, 2000, three surface water samples were collected by EPA's oversight contractor (Tetra Tech). Two surface water samples were collected in the drainage ditch on the north side of CR 126. One of these locations was in the drainage ditch immediately down-gradient of the wastewater treatment plant discharge point into the drainage ditch along the north side of CR 126 (sample was designated NDW02). The other location was in the drainage ditch immediately upgradient of the ditch discharge into Turtle Bayou (NDW01). The other surface water sample (and a duplicate sample) were collected on the south side of CR 126 just east of the driveway into the Office Trailer Area (SDW01) (See Figure 1).

The samples were sent to EPA's Houston laboratory for analysis. Each sample was analyzed for volatile organics, semi-volatile organics, and total metals. No volatiles or semi-volatiles were detected in any of the samples. In regards to metals, the following table summarizes what was detected.

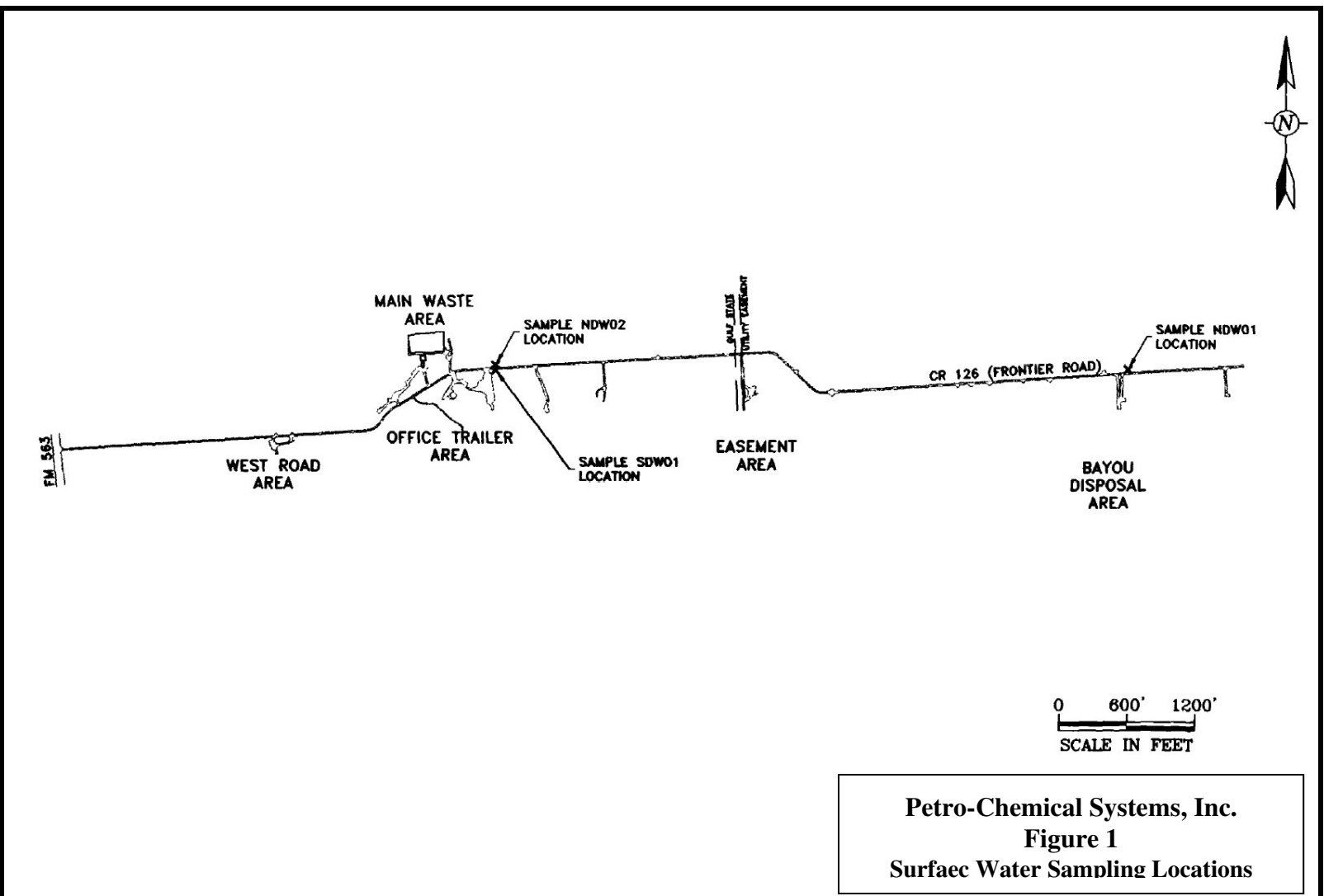


TABLE 1
DETECTED METALS IN SURFACE WATER SAMPLES COLLECTED
ON JUNE 28, 2000

Metal	MCL (µg/L)	Detection Limit (µg/L)	NDW01 (µg/L)	NDW02 (µg/L)	SDW01 (µg/L)	SDW01 (Duplicate Sample) (µg/L)
Aluminum	NA	100	661	ND	118	ND
Barium	2000	10	60	103	106	104
Calcium	NA	150	25900	45200	46500	44800
Iron	NA	25	589	190	208	283
Magnesium	NA	150	5050	7210	7380	7180
Manganese	NA	5	58	17	18	51
Potassium	NA	1000	5160	6270	6480	6500
Sodium	NA	500	76700	104000	107000	103000

Notes:

NA Not available.

ND Not detected by laboratory.

MCL Maximum Contaminant Level – The highest level of a contaminant that is allowed in drinking water.
 µg/L Micrograms per liter or parts per billion.

Two surface water samples were most recently collected in April 2006. These samples were collected on the south side of the CR 126 bridge (see Figure 2). The surface water samples were collected to evaluate the attribution due to flooding and agricultural runoff. The surface water samples were analyzed for volatile organics, semi-volatile organics, metals, pesticides, and herbicides. Table 2 summarizes the results for the surface water samples. One pesticide was detected in surface water. 4,4-DDT was detected in the duplicate sample collected at a concentration of 0.000518 mg/L (parts per million). However, the pesticide was not detected in sediment samples collected from Turtle Bayou. As a result, evidence was not found to indicate that agricultural runoff in surface water is attributing to sediment in Turtle Bayou or surrounding soil that may be impacted with surface water during flooding events.

Surface water samples have not been collected near FM 563. However, in March 2004, samples were collected along the CR 126 right-of-way to determine if volatile organic contaminants were present in the shallow soil at concentrations that could present a risk to a future worker in the area. Soil samples were collected from 62 shallow soil borings (0 top 3 feet below ground surface) along both sides of the CR 126 West Area right-of-way beginning at the intersection of CR 126 and FM 563 in an eastward direction for 450 feet (see Figure 3). The soil borings maintained an interval spacing of approximately 15 feet.

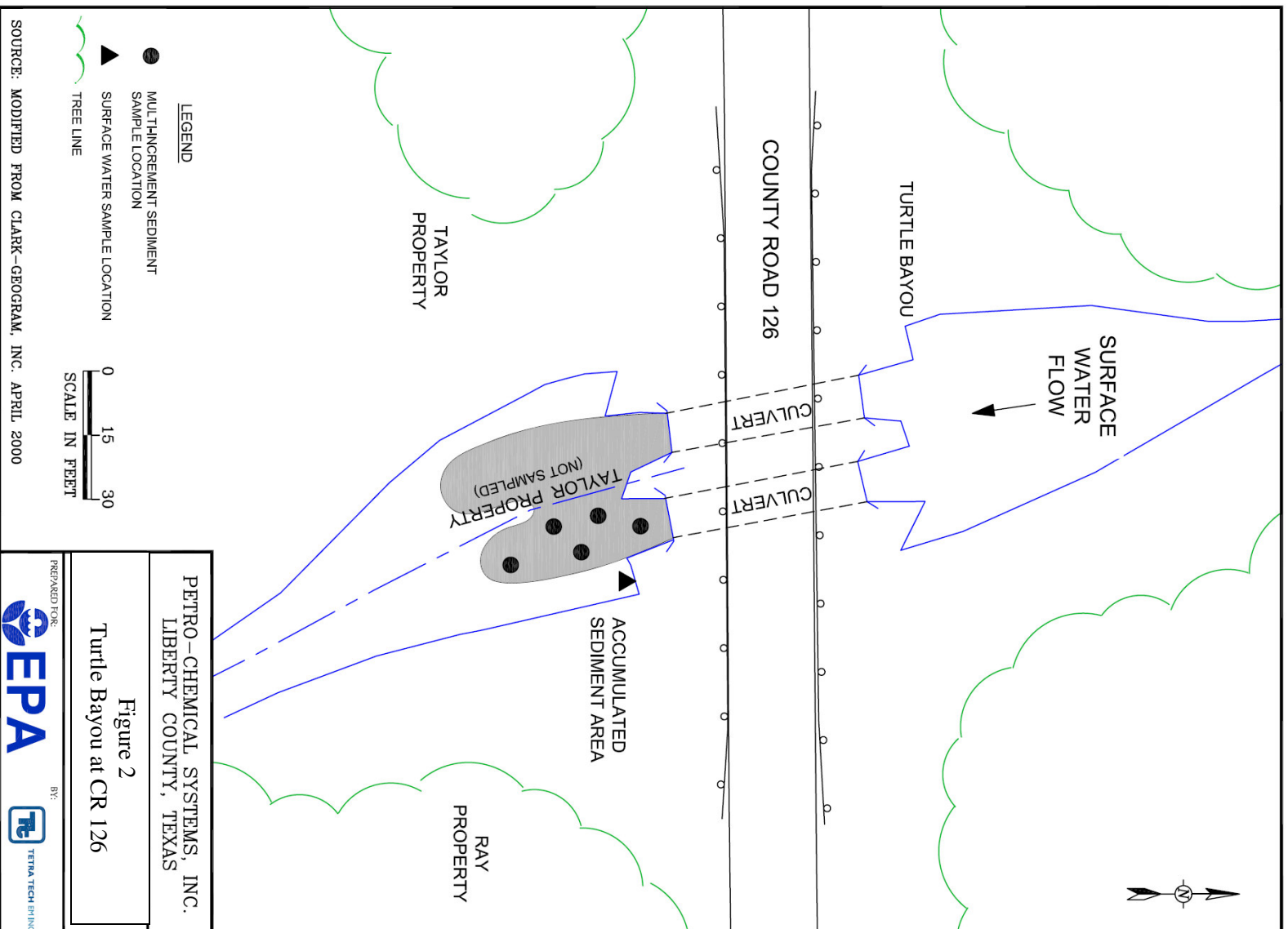


TABLE 2
SUMMARY OF RESULTS – TURTLE BAYOU SURFACE WATER
PETRO-CHEMICAL SYSTEMS, INC. SITE
APRIL 2006

Analyte	SW-01	SW-01-D
VOLATILE ORGANIC COMPOUNDS (mg/L)		
Acetone	0.0100	0.0104
Benzene	0.000500 J	<0.000117
Carbon Disulfide	0.000380 J	<0.000257
Methylene Chloride	0.00123 J	0.00108 J
Vinyl Chloride	0.000620 J	0.000518 J
PESTICIDES (mg/L)		
4,4-DDT (p,p'-DDT)	<0.00000369	0.000518
METALS (mg/L)		
Aluminum	0.582	0.706
Barium	0.090 J	0.0984 J
Chromium	0.00201 J	0.00141 J
Iron	2.390	2.990
Lead	0.00562	0.00493 J
Manganese	0.565	0.634
Selenium	0.00701 J	0.0105 J
Vanadium	0.00304 J	0.00275 J
Zinc	0.00649 J	0.00739 J

Notes:

- D Field duplicate sample
- J Estimated value for the analyte is below the adjusted reporting limit but above the instrument reporting limit.
- mg/L Milligram per liter (parts per million)

The entire 3-foot interval was screened using a flame ionization detector (FID) and the discrete interval with the highest FID reading was sampled. Soil samples were collected using EnCore® sampling device and were submitted for laboratory analysis.

The analytical results for those soil samples with at least one detected analyte are summarized in Table 4. For comparison purposes, the US EPA Region 6 Medium-specific Screening Levels (MSSLs) for an outdoor worker are shown in Table 3. No volatile organic compounds were detected in the CR-126 right-of-way samples at concentrations exceeding their respective MSSL for an outdoor worker.

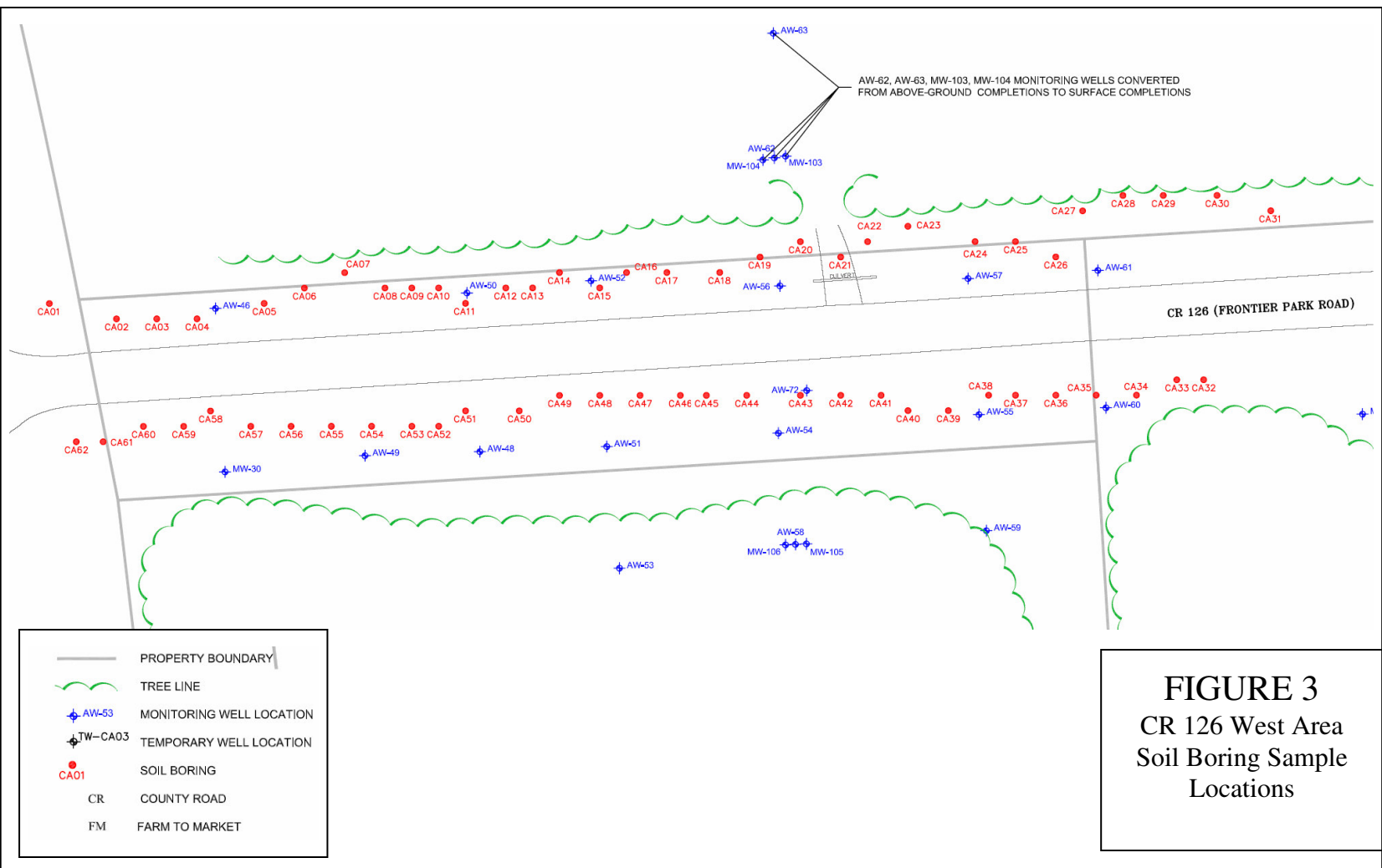


TABLE 3
Analytical Results Summary – CR 126 Right-of-way Soil Borings

Station Location	Volatile Organic Compounds (mg/kg)										
	Acetone	Benzene	2-Butanone	1,1-DCA	1,2-DCA	trans-1,2-DCE	ETB	PCE	Toluene	Vinyl Chloride	Xylenes
CA19	--	--	--	--	--	--	--	0.006 LJ	--	--	--
CA24	0.082 BJ	--	--	--	--	--	--	--	--	--	--
CA31	0.110 J	--	--	--	--	--	--	--	--	--	--
CA33	0.035 J	--	--	--	--	--	--	--	--	--	--
CA34	0.006 LJ	--	--	--	--	--	--	--	--	--	--
CA36	-- (0.033 J)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)
CA37	0.030 J	--	--	--	--	--	--	--	--	--	--
CA38	0.062 J	--	--	--	--	--	--	--	--	--	--
CA39	0.039 J	--	--	--	--	--	--	--	--	--	--
CA40	0.069 J	--	--	--	--	--	--	--	--	--	--
CA41	0.091 J	0.005 LJ	--	0.015	--	--	--	--	--	0.010	--
CA42	0.085 J	--	--	0.170	--	--	--	--	--	0.018	--
CA43	0.089 BJ	0.007 LJ	--	0.380	--	0.007 LJ	--	--	--	0.073	--
CA44	0.110 J	--	--	0.350	0.010	0.004 LJ	--	--	--	0.037	--
CA45	--	--	--	0.100	--	--	--	--	--	0.009 LJ	--
CA46	0.120 J (--)	-- (--)	-- (--)	0.014 (0.004 LJ)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)
CA47	--	--	--	--	--	--	--	--	--	0.010 LJ	--
CA49	--	--	--	--	--	--	0.001 LJ	--	0.001 LJ	--	0.005 LJ
CA54	0.030	--	--	--	--	--	--	--	--	--	--
CA55	0.011 J	--	--	--	--	--	--	--	--	--	--
CA56	0.006 LJ (0.011 LJ)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)
CA62	0.042 J (0.017 J)	-- (--)	0.016 (0.013)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)
Outdoor Worker Soil MSSL	100,000	1.6	34,000	2,300	0.84	240	230	1.7	520	0.43	210

Notes:

J The reported value is estimated.

L The reported concentration is below is below the contract required quantitation limit.

In addition to sampling wells on the site, EPA will also sample Ms. Davis' well since it is a shallow well and her residence is located very close (i.e., right across the road) from the site.

12.

Ms. Cheryl Bennett

Ms. Bennett stated that her property has not been sampled.

EPA Response

As part of the numerous investigations and sampling activities that have occurred at the site over the years, ground water samples have been collected near the Bennett residence and from the Bennett's drinking water well.

The following information was taken from the *Petro-Chemical Systems Site (Turtle Bayou) Supplemental Remedial Investigation and Focused Feasibility Study* (SRI/FFS) *Report (Revision 1)* (Roy F. Weston, September 1991). On April 8, 1991, a 33 foot deep monitoring well (MW-58) was installed south of County Road (CR) 126 and about 100 east of the Bennett residence. This well was screened from 14.5 to 24.5 feet below ground surface. Samples from this well analyzed for volatiles, semi-volatiles and metals. An initial sample was collected on April 8, 1991. The SRI/FFS report (Table 4-15 and Table E-2), showed no that no compounds were detected above the laboratory analytical method detected limits. The compounds listed in Table 4-15 and Table E-2 are the following: total PNA's (polynuclear aromatic compounds), benzo(a)pyrene, total BTEX (benzene, toluene, ethylbenzene, xylene), benzene, styrene, TBA (tert-butyl alcohol), lead, and moly (molybdenum). The well was sampled again with a duplicate sample on April 24, 1991. Both the original sample and duplicate sample showed no compounds were detected above the laboratory method detection limit.

MW58 was most recently sampled on February 18, 2004. The sample was analyzed for 36 volatile organic compounds (VOCs) including BTEX and vinyl chloride, and the semi-volatile compound - naphthalene. No compounds were detected.

The Bennett well has been sampled by Lyondell Chemical Company. As discussed in the Lyondell Monthly Progress Reports for December 1996, February 1997, and September 1998, samples were collected from the T. Bennett Well on December 15, 1996, February 4, 1997, and September 24, 1998. A summary of the sample results from the December 1996 sampling were provided in the December 1996 Monthly Progress Report and are as follows:

1,2-dichloroethane	< 5 µg/L (parts per billion)
acetone	< 10 µg/L
benzene	< 5 µg/L
lead	< 0.005mg/L (parts per million)
methylene chloride	< 5 µg/L
tert-butyl alcohol	< 50 µg/L

The < symbol indicates that the compound was not detected above the laboratory analytical detection limit.

As requested, EPA will sample the wells of on-site residents and those in very close proximity to the site.

13.

Mr. Donnie Taylor & later similar question by Mr. John Fondon

[Donnie Taylor] Do you feel the Duke explosion changed anything?

[John Fondon] What affect did it the explosion have? Mr. Fondon stated his well experience sediment problems after the explosion.

EPA Response

Based on conversations with several residences in the area, the Duke Energy explosion which occurred August 24, 2004, about 1 mile south of the site may have impacted people's drinking water wells in the area. Shortly after the explosion, residents reported that their wells had significant siting problems. The vibration caused by the explosion certainly had the potential to mobilize contamination in the ground water. Please note, that historical migration of the groundwater contamination has been limited to the general area where the disposal occurred and has not migrated much beyond that (i.e., a few hundred feet). As part an ongoing ground water monitoring program, which began the last quarter of 2005, several wells on site will be monitored for over the next two years (i.e., eight quarters). Evaluation of this data, in comparison with data collected prior to the explosion, may indicate any potential impact of the Duke Energy explosion on the contaminated groundwater plumes.

14.

Mr. Dennis Lewis

Mr. Lewis inquired as to the potential impact of site contamination on trees, plant growth, tap roots, etc.

EPA Response

The primary contaminants in the groundwater at the site are referred to as volatile organic compounds (VOCs). Trees have been used across the county, especially deep rooted trees and plants that use large volumes of water as a means to remove VOCs from the soil and groundwater by a variety of mechanisms including: plant transpiration, absorption to root tissue, biodegradation in the root zones or by

plant uptake and metabolism. All the mechanisms are referred to collectively as phytoremediation. The vegetation can also serve as a hydraulic barrier to the water carrying the contaminants.

In regards to areas of the site where contamination has been identified, there has not been a noticeable impact on the trees and plants. During the public meeting, an unidentified speaker suggested that any trees coming down at this time are coming down because of the vascular disease caused by the freeze in 1995. The unidentified speaker stated between the freeze and the rain, and the oak trees having no roots, they just fall down.

15. Ms. Liz Taylor

Ms. Taylor inquired about how to find information on the health effects of chemicals that are detected at the site. How would we know what we need to be aware of?

EPA Response

To determine what risks are present at sites, the EPA conducts a baseline human health risk assessment. The purpose of the baseline risk assessment is to assess the risk to human health posed by the contaminants present at the site. A toxicity and exposure assessment for chemicals detected at the site are discussed in the risk assessment. The risk assessment for the Petro-Chemical Site determined that potential exposure to contaminated ground water was the primary risk driver at the site. Site cleanup criteria have focused on the risk posed by contaminated ground water and by the direct contact exposure.

The risk assessment is available for review at the information repository.

16. Mr. Dennis Lewis

Mr. Lewis asked if EPA was aware of who is responsible for dumping at the site.

EPA Response

As part of EPA's involvement at the Site, the EPA has identified parties who owned the Site, operated the Site, transported waste to the Site, and/or generated hazardous waste which was disposed at the Site. These parties are identified by the EPA as Potentially Responsible Parties. Information regarding who EPA has identified is part site file and is available upon request.

17. Mr. Brian Johnson

When was the road remediated?

EPA Response

In March 1987, the Frontier Park Road Record of Decision was signed. The Record of Decision outlined the following remedial action:

- Excavate contaminated soil to below 100 parts per million polyaromatic hydrocarbons.
- Temporary disposal of contaminated soil in a RCRA storage facility.
- Construct a road over excavated areas and existing roadway.
- Temporary relocate on-site residents during construction.

Approximately 5,900 cubic yards of soil contaminated with a concentration greater than 100 parts per million polynuclear aromatic hydrocarbons (PAH) or 100 parts per million total volatile organic compounds (VOCs) was excavated. Contaminated soil was excavated from 1 to 5 feet in depth from the first 1,800 feet of Frontier Park Road (currently CR 126). The excavated material was placed in the storage facility (above ground landfill) in the Main Waste Area. The excavated area was backfilled with clean soil and the entire length of the road was paved. This work was completed in August 1988. Although the construction of the road was completed in August 1988, because the road acts as a cap/barrier for soils with PAH or VOC concentrations less than 100 parts per million, long term maintenance of the road is required.

18.

Mr. Dennis Lewis

Are there bulkheads around the soils vault?

EPA Response

No, there are no bulkheads around the soils vault. Bulkheads are retaining walls usually constructed parallel to a shore whose primary purpose is to hold or prevent sliding of soil caused by erosion or wave action. They are used to protect bluffs by retaining soil at the toe of a slope or by protecting the toe from erosion and undercutting. The soils vault was constructed with plastic liners placed below and above the contaminated soil which is stored there (see vault construction photos below showing initial installation of the plastic liners).



Long-term maintenance of the soils vault is required prevent exposure to the contaminated soils contained within the vault. It is important to note that treatment of the contaminated soils within the vault has occurred over the past several years. Treatment technologies applied have included soil vapor extraction and in-situ bioremediation. Based on a review of vault soil composite sample data, the residual contaminant soil concentrations are less than the TCEQ Commercial /Industrial soil standards for 0 to 4 feet below ground surface (bgs). However, the samples did exceeded the 1991 ROD naphthalene soil standard of 70 mg/kg, and also exceeded the 1998 ROD Amendment's benzene standard of 1.33 mg/kg for surface soil (i.e., 0 – 2 feet bgs). Requirements for leaving the vault include:

- Obtaining permanent control of the property, either by fee-simple purchase of the property or by securing a written agreement with the property owner;
- Implementing of a ground water monitoring program to assist in the long-term monitoring;
- Fencing the area to prevent unauthorized access;
- Placement of an irrevocable deed restriction on the property to prevent activities that might adversely affect the integrity of the vault and monitoring wells;
- Provide for perpetual maintenance and access to the vault.

These requirements will be implemented by Lyondell Chemical Company.

19. Ms. Heather Calico

How many public meetings have you had in the past and why are you just now worried about making the public aware of what's going on? We have been aware for a while; but other people, this is news to them. Why are you just now letting them know?

EPA Response

The EPA is required by law to have a public meeting at the stage when a remedy or remedy modification is proposed. In the past, we have had nine public meetings (including community relations open houses and workshops). Over the last several years, the EPA has been dealing directly with local citizens whose property is contaminated. When sampling was conducted, the sampling results were only provided directly to the property owner. When Lyondell Chemical Company was conducting remediation activities at the West Road Area, Main Waste Area, Office Trailer Area, and the Easement Area, they were very proactive in the community in updating the community of their activities and often conducted community service projects for individual landowners. The EPA will ensure that the community is better informed of site activities through fact sheets and public availability sessions.

20. Mr. Ted Bennett

When EPA comes out to sample, are you going to make sure we are there?

EPA Response

If the EPA comes out to sample individual's wells, we will continue to notify the individual property owners and arrange for a time when we can sample. For larger site activities, the EPA will be sure to provide prior notification to the local community through fact sheets and/or public availability sessions.

21. Mr. Ted Bennett

Now that he [Donnie Taylor] is not using his well and I'm using mine, even though the water may be good now, are they going to start pulling that contaminated water to my well?

EPA Response

Because contaminants will remain in areas of the site at concentrations that will preclude unrestricted use, long-term monitoring will be required to verify that other wells located near these areas with known groundwater contamination at concentrations above the ROD goals are not being adversely impacted. An objective of the monitoring is to verify that the groundwater plumes are not expanding down-gradient, laterally or vertically.

22. Mr. Ted Bennett

On page 11 of the [Proposed Plan] it says plugging or conversion of nearby water wells into monitoring wells. What does a near by water well mean?

EPA Response

The section of the proposed plan to which Mr. Bennett is referring relates to the proposed remedy for the Bayou Disposal Area. In regards to the "near by water well," the Proposed Plan was referring to wells currently located in the Bayou Disposal Area and potentially wells in the immediate area. Mr. Bennett residential drinking water well was not specifically identified for conversion.

23. Mr. John Fondon

Do you have a list of everybody's water you tested? I would like to know if mine has been sampled. I live on CR 128, about 150 yards from the end of CR 126.

EPA Response

Information regarding residential well sampling is included in the site file. These wells have primarily included wells located near known areas of contamination.

Based on review of the site file, Mr. Fondon's well has not been sampled by the EPA.

24. Mr. Ted Bennett

Mr. Bennett asked where active treatment was targeted (i.e., application of the in situ chemical oxidation soil mixing treatment).

EPA Response

In situ chemical oxidation soil mixing is the proposed remedy for the CR 126 West Area. The treatment area encompasses the existing CR 126 and road shoulders, starting approximately 150 feet east of FM 563 and ending approximately 400 feet east of FM 563.

25. Mr. Dennis Lewis

In response to a discussion of previous excavation work conducted on Frontier Park Road, Mr. Lewis asked if this occurred south of the vault discussed earlier.

EPA Response

The previous excavation work conducted on Frontier Park Road took place within the first 1,800 feet of the road from FM 563 intersection and going east.

26. Ms Cheryl Bennett

In response to a discussion of the definition of the plume boundary in the CR 126 West Area, Ms. Bennett asked when all the information was collected.

EPA Response

Information has been collected in CR 126 West Area from 1999 thru 2006. As a result of routine sampling conducted by Lyondell Chemical Company of monitoring wells located along CR 126 in 1999, additional wells were installed in this area by Lyondell Chemical Company to delineate the extent of contaminated ground water in 1999 and 2000. As of 2004, a total of 20 shallow wells (approximately 20 feet deep), two intermediate wells (approximately 50 feet deep), and two deep wells (approximately 90 feet deep) had been installed. One shallow slant well was also installed under CR 126 in 2001. Additionally, over 150 soil samples were collected from 21 soil borings to investigate the extent of contaminated soil.

Additional investigations, performed by Tetra Tech EM Inc. on behalf of the EPA, entailed sampling private water wells, select monitoring wells, soil gas and surface soils. The results were used to estimate the extent of contamination and evaluate remedial alternatives.

Additional investigations were performed by Environmental Resources Management (ERM) on behalf of El Paso Energy to support ground water

modeling efforts and to further define the depth of contamination for remedy alternative evaluations in 2005.

In February of this year, an in situ chemical oxidation (ISCO) soil mixing field pilot study was conducted. The purpose of the study was to demonstrate the feasibility of this remediation technique and to provide information for preparing full-scale remediation specifications.

27. Mr. Jason Vanloo

What chemical oxidant are you proposing to use? What kind of chemical constituents are targeted? Did you detect any by-products, breakdown products?

EPA Response

Based on the results of a site-specific bench scale study conducted in early 2005 and a field pilot study conducted in February 2006, persulfate was selected to treat volatile organic compounds present at the CR 126 West Area. Analytical results indicate that injection of persulfate as an oxidant can destroy in practice up to about 80% of the contaminants of concern (COCs) in the ground water and soil. This estimate is based on bench-scale tests that demonstrate over 90% destruction of the most predominant COCs in a laboratory setting and on pilot testing that demonstrated nearly 100% destruction after treatment. In regards to the detection of by-products/breakdown products, an Environmental Resources Management (ERM) representative familiar with the ISCO testing indicated that ERM did not detect any. Additional information regarding the bench scale testing and pilot study can be found in the *Mechanical Auger Mixing (MAM) In Situ Chemical Oxidation (ISCO) Pilot Test Report, County Road 126 West (Far West Road Area), Liberty County, Texas, EPEC Polymers Inc.* (Environmental Resources Management, July 18, 2006).

28. Mr. Dennis Lewis

Mr. Lewis asked about potential traffic implications of the proposed remedy for the CR 126 West Area.

EPA Response

An alternative route for traffic will be established prior to the initiation of remediation activities in the CR 126 West Area. The EPA and EPEC Polymers are working with the local county officials to determine the construction requirements for the alternate route.

29. Mr. Ted Bennett and Mrs. Cheryl Bennett

Ted and Cheryl Bennett had questions regarding monitoring wells located in the Bayou Disposal Area which were plugged and abandoned. Specifically, monitor

wells MW-13R, MW-51, and MW-100, from which samples at one time had benzene concentrations above the federal drinking water standards.

EPA Response

Monitoring wells in the Bayou Disposal Area (MW-13R, MW-14, MW-51, MW-58, MW-59, MW-100, and MW-102) have been sampled repeated over the past several years. The purpose of this sampling was to ensure that contaminant concentration levels in the ground water were not increasing and were being reduced through natural attenuation processes. Samples were analyzed for volatile organic compounds, semi-volatile organic compounds, and metals. In regards to benzene, Table 4 presents the groundwater data for benzene from samples collected from the Bayou Disposal Area monitoring wells from 1999 to 2005.

The monitoring wells are all shallow monitoring wells screened within the shallow permeable zone – within thirty-five feet of the ground surface. Monitoring wells MW-58, MW-101, and MW-102 are located along CR 126 in hydraulically upgradient positions, and monitoring wells MW-13R, MW-14, MW-51, MW-59, and MW-100 are aligned in a north-south direction. Based on water level information from wells in the area, the shallow groundwater flows to the south. Groundwater at the Bayou Disposal Area occurs in a shallow sand aquifer encountered about 12 feet below ground surface. The sand aquifer appears to be about 10 feet thick. The sand aquifer pinches out to the south. Figure 4 depicts the monitoring well locations.

30.

Mr. Ted Bennett

In regards to a discussion regarding sporadic low level detections of contaminants (i.e., benzene and vinyl chloride) in the Bayou Disposal, Mr. Bennett asked how to account for the variation in detected ground water concentrations.

EPA Response

Variations in contaminant detections can result from a variation in water levels. For example, if contamination is present at a depth below the water table, you would expect to see corresponding contaminant concentrations in the groundwater samples. Similarly, rainfall could provide a means for transporting (i.e., via leaching) contamination if present in the overlying soils into the groundwater. In general, it is important to note that for the Bayou Disposal Area, the majority of samples collected from these wells tested clean. When volatile contaminants were detected, it was sporadically and at low concentrations (i.e., at concentrations near the corresponding MCL). In addition, volatile contaminants which have been detected (i.e., benzene, vinyl chloride), are amenable to bioremediation which means they can be reduced given natural conditions present at the Bayou Disposal Area.

TABLE 4
BAYOU DISPOSAL AREA MONITORING WELLS
BENZENE SAMPLE RESULTS

Sample Date	MW13R (µg/L)	MW-14 (µg/L)	MW51 (µg/L)	MW58 (µg/L)	MW59 (µg/L)	MW100 (µg/L)	MW101 (µg/L)	MW102 (µg/L)
December 1999	ND	NS	ND ND*	ND	ND	ND	ND	ND
March 2000	ND	NS	ND	ND	ND	ND ND*	ND	ND
June 2000	ND	NS	ND	NS	ND	ND	ND ND*	ND
October 2000	ND ND*	NS	ND	NS	ND	ND	ND	ND
January 2001	ND	NS	23.7 20*	NS	ND	ND	ND	ND
April 2001	ND	NS	17.5**	NS	ND	ND	ND	ND
July 2001	ND	NS	ND	NS	ND	ND	ND	ND
April 2002	ND	NS	3.9	NS	ND	ND	ND	ND
February 2004	ND	ND	ND	ND	ND	ND	ND	ND
June 2004	Well plugged and abandoned April 2004	Well plugged and abandoned April 2004	0.77	Well plugged and abandoned April 2004	Well plugged and abandoned April 2004	Well plugged and abandoned April 2004	***	***
October 2004			ND				***	***
February 2005			ND				***	***

Notes:

ND Benzene was not detected in groundwater sample – the EPA Houston laboratory analytical detection limit was 2 parts per billion. Federal drinking water standard for benzene is 5 parts per billion.

NS Not sampled.

MW Monitor Well

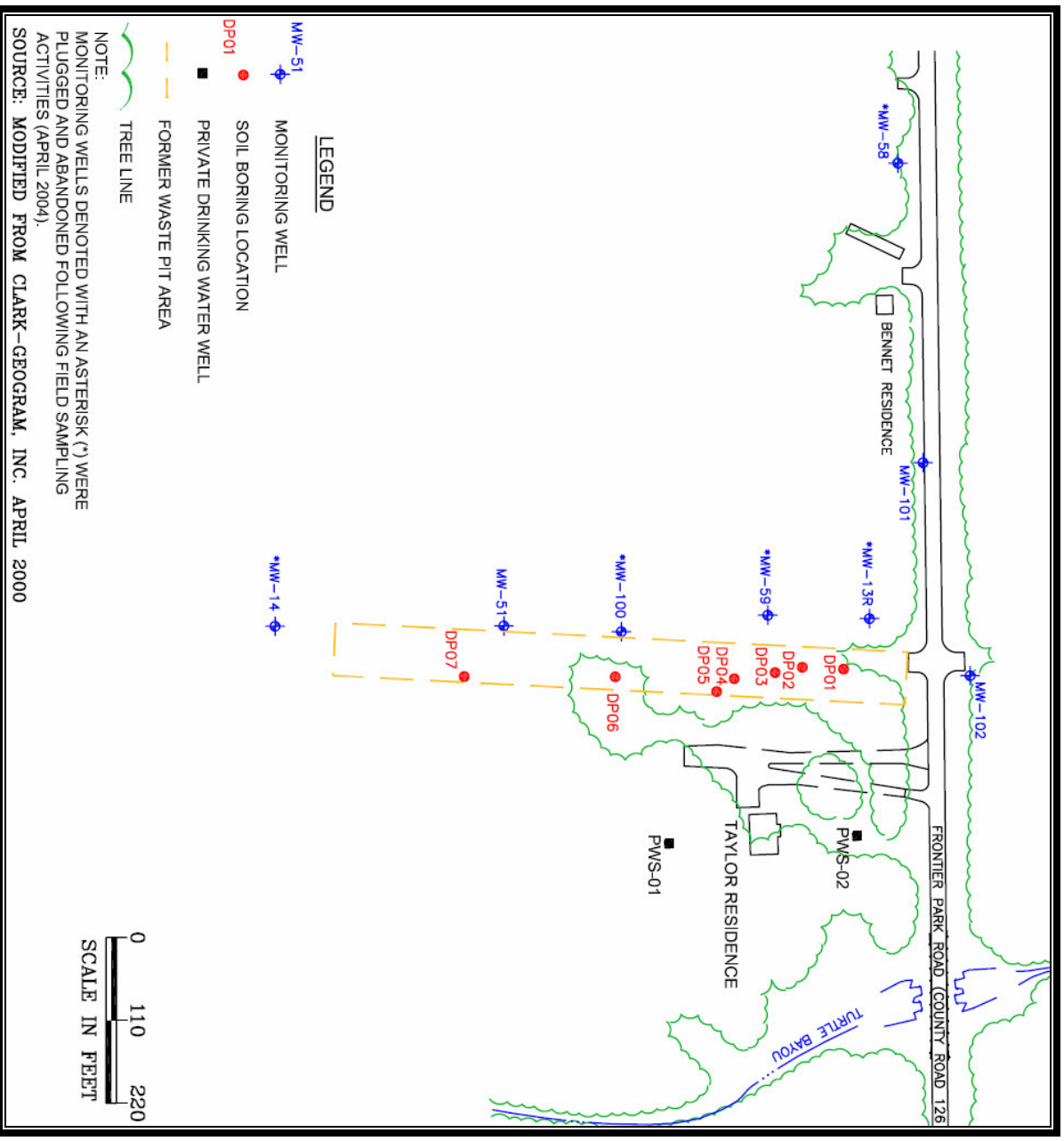
µg/L Micrograms per liter or parts per billion.

* Duplicate sample collected at same time as original sample.

** Three samples were collected. Only one of the three samples analyzed detected benzene.

*** Analyzed for metals (i.e., cadmium, silver)

FIGURE 4
BAYOU DISPOSAL AREA
MONITOR WELL LOCATIONS



Note: The following wells in the Bayou Disposal Area have been plugged and abandoned: MW-13R, MW-14, MW-58, MW-59, and MW-100. It is important to note that these wells were plugged and abandoned only after having been tested and found to not to exceed the site's ground water cleanup criteria (i.e., Federal drinking water standards).

31. Mr. Dennis Lewis, Mr. Ted Bennett, & Ms. Cheryl Bennett

Several questions were asked regarding the location and sampling of wells (i.e., how many, where, when sampled, what was detected).

EPA Response

Over the years, several hundred wells have been installed and tested at the site. The majority of wells were installed in areas where contamination was suspected. Wells were also installed along CR 126 in the early 1990s. Information regarding the sample results from the site wells can be obtained from EPA. Additionally, in response to citizen's requests for sampling, residential wells (especially those located along CR 126) will be conducted.

32.

Mr. Dennis Lewis

In regards to deed restrictions placed on site property owned by Lyondell Chemical Company, Mr. Lewis asked the following question: This deed restricting on the portion of land that Lyondell purchased that falls within the category of non-residential, does that give them an opportunity to use that facility as a future potential plant site or an operating functioning property? Have they given any indications as to the future use for the property?

EPA Response

The areas of the site owned by Lyondell Chemical Company include the West Road Area, Main Waste Area, Office Trailer Area, and the Easement Area (see Figure 1). For these areas, Lyondell Chemical Company's institutional control objectives can be summarized as follows:

- To prevent direct exposure to the affected soils.
- Eliminate the use of groundwater beneath the site.
- Ensure the continued integrity of existing containment structures (i.e., slurry wall in the West Road Area, vault in the Main Waste Area).
- Ensure the continued integrity of the existing vegetative cover.
- Provide for site access, site security, periodic inspections, future investigations, remedial actions, soil or groundwater sampling, mowing, maintenance, or repair of the structures or equipment necessary to complete the above objectives. Access for the above will be allowed for Lyondell Chemical Company, its contractors, EPA, the Texas Commission on Environmental Quality (TCEQ), or successors.

Lyondell has informed the EPA that the following restrictions will be placed in the property deed:

- Excavations or construction from 0-4 feet below ground surface is prohibited except by permit granted by property owner, Lyondell

Chemical Company. Notification to Lyondell shall be made through a Texas One Call injury.

- Excavations or construction, more than four (4) feet below ground surface is expressly prohibited. Specifically, no excavation or construction will be allowed that might affect the integrity of the West Road Area slurry wall or the Main Waste Area vault.
- No use of the affected property shall be made which will impair the existing vegetative cover.
- No drinking water wells will be permitted.
- Site access/security will be controlled by a combination of fences, signs, cable guards, and natural barriers. Periodic inspections, groundwater monitoring, and maintenance will be performed as required. Signs will be posted at apparent access locations, which indicate that chemicals may exist on the property and that digging and drilling are restricted to protect human health and the environment.

Lyondell, and its successors, shall notify EPA, TCEQ, and/or its successors, of its intent to convey any interest in their property. Such conveyance shall not be made without prior written approval of EPA, TCEQ, and/or successors. The property owner and its successors shall consummate no conveyance of title, easement, or other interest in the property without adequate and complete provision for continued maintenance and protection of the affected areas.

In response as to whether Lyondell has given any indication as to the future use of the property, they have stated that since the wastes or waste constituents will remain onsite for the foreseeable future, the duration of the institutional controls will be in perpetuity.

33.

Mr. Ted Bennett

In regards to provide written comments on EPA's Proposed Plan, Mr. Bennett asked if written comments would include e-mail.

EPA Response

E-mail comments provided on the Proposed Plan within the public comment period would be accepted by EPA.

34.

Mr. Donnie Taylor, Mr. Dennis Lewis, Mr. Ted Bennett, Ms. Cheryl Bennett, Ms. Lydia Davis

Numerous comments and concerns were expressed in regards to the condition and maintenance of the CR 126 and the drainage ditches along CR 126. Is somebody responsible for the road? What about the bridge – is it too low?

EPA Response

CR 126 (previously known as Frontier Park Road) was constructed pursuant to the March 27, 1987 Record of Decision. The objectives of this work were to prevent direct contact with highly and moderately contaminated soils and to improve access to the site for heavy equipment for facilitate remedial investigation sampling and monitoring and future remedial actions. The construction of the road work was completed using federal funds (money from the Hazardous Substance Superfund) and a 10% match from the State of Texas. For Fund-financed remedies, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section 104(c) requires States to pay for or ensure payment for all future maintenance.

At a Liberty County Commissioner's Court meeting held on September 28, 1987, the court approved the low water crossing on Turtle Bayou with a finished centerline elevation of approximately 36.0 feet M.S.L. (Mean Sea Level). In regards to the road elevation, the County of Liberty Subdivision and Road Regulations require a finished elevation of one foot above the flood plain as established by the Federal Emergency Management Agency. The road was constructed at the existing grade, much of which is below the flood plain elevation.

The EPA is currently working with the County and TCEQ officials in an effort to identify the County's requirements for acceptance of the road. In conversations with County officials, they have indicated that the County would conduct road maintenance if the road is constructed to meet the County's road criteria with any approved road construction variances.

35.

Mr. Ted Bennett

The proposed plan states that if the groundwater monitoring indicates that the groundwater contamination is expanding either vertically or horizontally, additional studies will be conducted as necessary to develop and evaluate alternative contingency measures that may be required to address the expanding plume. How often are they going to be monitoring the wells?

EPA Response

The initial sampling frequency will be quarterly for two years (i.e., 8 sampling rounds over two years). Following the initial two years of sampling, trends should be established and the monitoring frequency reduced. The monitoring will serve to 1) provide adequate warning of impact to receptors, 2) detect plume expansion, 3) detect changes in geochemistry that correspond to changes in attenuation, and 4) indicate that contaminant reduction is actually taking place.

36.

Mr. Donnie Taylor

What is the estimated ballpark cost for this next phase?

EPA Response

The estimated cost to implement the CR 126 West Area remedy is \$8 to \$12 million. The estimated cost to implement the Bayou Disposal Area remedy (assuming soil cleanup to the residential land use cleanup criteria) is \$460,000.

37. Mr. Donnie Taylor

What is the government's cost for the next phase?

EPA Response

The EPA's cost for the next phase has not been estimated. Anticipated future EPA costs will include costs associated with the following:

- Oversight of potential responsible party work for the Bayou Disposal Area and CR 126 West Area.
- Investigative work associated with the MW-109 Area.
- Residential well sampling and analysis.
- Review of groundwater monitoring data from the West Road Area, Main Waste Area, Office Trailer Area, and Easement Area.
- Litigation and cost recovery support.
- Community relations (i.e., fact sheets, public availability sessions), and
- Costs associated with conducting 5-Year Reviews.

38.

Mr. Ted Bennett

The estimated cost to implement the CR 126 West Area is 8 to 12 million dollars, that's to remediate?

EPA Response

Yes, the 8 to 12 million dollars is the estimated cost to remediate the CR 126 West Area. This estimate includes costs for engineering and planning, in-situ soil mixing, off-gas treatment, stabilization, treatment and disposal of heaved soil, groundwater monitoring, and institutional controls.

39.

Mr. Ted Bennett

Would this stuff still migrate if they did nothing and just fence the whole place off or would they still have to come in and do something with it?

EPA Response

Doing nothing and fencing the entire site would not prevent contaminant migration. Actions to address the contamination would still be required even if all the areas where disposal occurred were fenced.

40. Mr. Ted Bennett

If you hypothetically came in and bought everybody out, would they have to do anything with the land? Fence it off and put them signs like we got, "Danger Contaminated Area Chemical Additives Do Not Enter," and all this crap?

EPA Response

If the property was bought out and land use changed from residential to commercial/industrial, less would be required to address the contamination. As discussed in the proposed plan, since the 1998 ROD Amendment, a significant change in the site's current and anticipated land use has occurred for large portions of the site. Specifically, for the site's West Road Area, Main Waste Area, Office Trailer Area, and Easement Area, residential land use is no longer reasonably anticipated. Lyondell Chemical Company has acquired these properties and will restrict access to these areas such that residential use on this property will not occur. Potential future exposures would likely be limited road utility workers, trespassers, site maintenance workers and contractors involved in the ground water monitoring program.

In consideration of the change in land use, additional direct contact soil cleanup criteria have been developed. These alternative cleanup criteria apply to areas where residential land use is not anticipated and are less stringent than the cleanup criteria developed for residential land use.

41. Ms. Cheryl Bennett

Is it cheaper just to buy everybody out?

EPA Response

The cost for buying everyone out has not been calculated. However, even if everyone was bought out, actions would still be required to address contamination and ensure that residual contamination does not impact anyone in the future.

42.

Ms. Kaderli

All that new ridiculous looking fencing that went up, is that theirs to stay? Lyondell did that and that's not going anywhere? It's there? Is it just going to stay there?

EPA Response

Because residual contamination remains in areas purchased by Lyondell, unlimited use and unrestricted exposure in the former waste disposal areas will not be permissible. To assist in preventing direct contact exposure to the affected soils, Lyondell has restricted access by the installation of fences, gates, signs, cable guards, and natural barriers.

43. Mr. Jason Vanloo

Going back to the 8 to 12 million dollar range on the West Road Area, is there a reason why there is such a wide range in cost on that?

EPA Response

When the cost estimate was developed, there was a lot of uncertainty. As discussed in EPA's *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA/540/G-89/004), Section 6.2.3.7 (Costs – Accuracy of Cost Estimates),

“It is important to consider the accuracy of costs developed for alternatives in the FS [Feasibility Study]. Typically, these ‘study estimate’ costs made during the FS are expected to provide an accuracy of +50 percent to -30 percent and are prepared using data available from the RI [Remedial Investigation].”

As the remedial design documents are developed, a better cost estimate can be developed.

44. Mr. Jason Vanloo

Is there a particular chemical constituent driving that risks?

EPA Response

There is no particular chemical constituent driving the risks. The chemicals of concern were selected to be representative of the classes of compounds detected (i.e., volatile organic compounds, semi-volatile organic compounds, & metals) and were also the most prevalent, mobile, persistent, and toxic compounds at the site. Additionally, as discussed in CERCLA Section 121(d) (Degree of cleanup), a remedial action shall require a level or standard of control which at least attains Maximum Contaminant Level Goals established under the Safe Drinking Water Act and water quality criteria established under section 304 or 303 of the Clean Water Act, where such goals or criteria are relevant and appropriate under the circumstances of the release or threatened release.

45. Ms. Cheryl Bennett

How do we know that more areas of contamination at the site will not be discovered in the future?

EPA Response

Based on how waste was disposed at the site, it is unknown if additional waste disposal areas will be identified in the future. Unpermitted waste disposal appears to have started at the site in the late 1960's. Disposal of waste at the site is documented in the Texas Water Quality Board records as early as 1971. Records indicate the dumping of waste oils in unlined pits and on Frontier Park road.

Since the site was never an authorized waste disposal facility, the exact nature of disposal activities at the site is uncertain.

Over the years, extensive sampling has been conducted at the site and numerous waste disposal areas have been identified. If additional waste disposal areas are identified in the future, they will be evaluated. Based on the evaluation, appropriate action will be taken.

46.

Ms. Cheryl Bennett, Ms. Forrest Kaderli, Ms. Lydia Davis

Ms. Bennett, Ms. Kaderli, and Ms. Davis expressed their concerns and problems they have been dealing with as a result of the site. These concerns/problems included site fencing/signage, property values, impacts on business, who are the potentially responsible parties, and uncertainty about potential health impacts.

EPA Response

To the extent possible, efforts will be made by the EPA to respond to local citizen's concerns. For example, to address citizen's questions regarding potential health effects, a meeting with people who can discuss these issues (i.e., from the Texas Department of Health) will be held. While risks can never be eliminated completely, the actions being proposed will reduce risks.

47.

Mr. Donnie Taylor

Why didn't you start the comment period before the public meeting?

EPA Response

The public meeting was scheduled to occur after the start of the public comment period to allow people the opportunity to review the administrative record prior to the public meeting. Additionally, the meeting location was only available on certain dates.

48.

Ms. Vickie Sensat

If the majority of people in this room are saying, "We want out, is this an option?" Will you guys consider that and say, "We will buy their property at fair market value and give them a chance to have a better life somewhere else," or are you saying, "We hear you but we're going to go auger and that's all we're going to do?"

EPA Response

The information below regarding permanent relocations was taken from the EPA's Interim Policy on the Use of Permanent Relocations as Part of Superfund Remedial Actions (OSWER Directive: 9355.0-71P, EPA 540F-98-033 PB98-963305).

The following list, although not inclusive, provides examples of the types of situations where permanent relocation may be considered. Generally, the primary reasons for conducting a permanent relocation would be to address an immediate risk to human health (where an engineering solution is not readily available) or where the structures (e.g., homes or businesses) are an impediment to implementing a protective cleanup. The examples are discussed in terms of how EPA could conduct an alternatives analysis applying several of the NCP (National Contingency Plan) nine criteria, leading to the consideration of permanent relocation as an appropriate option.

- Permanent relocation may be considered in situations where EPA has determined that structures must be destroyed because they physically block or otherwise interfere with a cleanup and methods for lifting or moving the structures safely, or conducting cleanup around the structures are not implementable from an engineering perspective. The methods may be technically unfeasible because they are too difficult to undertake or success may be too uncertain. Additionally, these methods may prove not to be cost-effective when compared with other alternatives that are protective of human health and the environment.
- Permanent relocation may be considered in situations where EPA has determined that structures cannot be decontaminated to levels that are protective of human health for their intended use, thus the decontamination alternative may not be implementable.
- Permanent relocation may be considered when EPA determines that potential treatment or other response options would require the imposition of unreasonable use restrictions to maintain protectiveness (e.g., typical activities, such as children playing in their yards, would have to be prohibited or severely limited). Such options may not be effective in the long-term, nor is it likely that those options would be acceptable to the community. For further discussion about developing remedial alternatives that include institutional controls see “Land Use in the CERCLA Remedy Selection Process.”
- Permanent relocation may be considered when an alternative under evaluation includes a temporary relocation expected to last longer than one year. A lengthy temporary relocation may not be acceptable to the community. Further, when viewed in light of the balancing of tradeoffs between alternatives, the temporary relocation remedy may not be practicable, nor meet the statutory requirement to be cost-effective. Additionally, a shortage of available long-term rentals within the immediate area, may make any potential temporary relocation extremely difficult to implement.

Permanent relocation is a complicated process that can cause personal and social disruption and stress. It is EPA’s preferred approach to address the risks posed by

the contamination by using well-designed methods of cleanup so people can remain safely in their homes and businesses. Therefore, permanent relocation as part of a Superfund response action generally should not be necessary to protect human health and the environment. However, as indicated above, there are limited cases where permanent relocation may be an important part of a remedial action. Regardless of the remedy selected, EPA should continue to: involve the community as early as possible in the Superfund process; partner with the local, state, and tribal governments; and make every effort to implement the action in an expeditious, thoughtful, and fair manner.

Additional information regarding Superfund relocations can be found at the following web site:

<http://www.epa.gov/superfund/tools/topics/relocation/index.htm>

49.

Ms. Cheryl Bennett

Are you going to send a copy of this transcript to everyone?

EPA Response

The transcript will be made available at the local library as part of the site's administrative record.

50.

Ms. Vickie Sensat

When they had the auger here last time and I'm across the road, one of the days they were drilling I had three huge trees fall on my property; and it was a clear, not windy day. I don't know what they did over there, but that's pretty unusual for three humongous trees to fall down. I don't know if that machine is vibrating the ground or what it is, but it's something. So, when you guys start drilling again, is it going to be disturbing, vibrating the ground close to these people's homes?

EPA Response

The location of the planned soil mixing activities is primarily under the footprint of the road and with the road right-of-way. It is not anticipated that the soil mixing activities will have any adverse impact on people's homes in the area.

In regards to the trees falling down, an unidentified local resident stated the following:

“We have trees fall all the time. Ask the kids. Most of these trees coming down right now are coming down because of the vascular disease caused by the freeze in '95. Between that and the rain and the oak trees have no roots, they just fall down.”

51. Mr. Ted Bennett
How soon do you think somebody will come around and start testing our wells?

EPA Response

The EPA will be holding a public availability session in late summer to early fall of this year. At this meeting, EPA will compile a list of residents who live on or very near the site that would like to have their wells samples. Working with EPA's support contractor, the sampling will be scheduled to occur shortly thereafter.

THE FOLLOWING WRITTEN COMMENTS WERE RECEIVED DURING THE PUBLIC COMMENT PERIOD:

52. Gloria & Tommy Smith
I would like to see more residential water well testing for residents who live ½ mile – 1 mile from CR 126, just for peace of mind.

EPA Response

Hundreds of wells have been installed on-site to determine the extent of known ground water contamination. In addition, EPA will sample residential wells along CR 126 and very near the site, if requested. Please note that based on data collected from the site over the years, the groundwater plumes have not migrated more than a few hundred feet from where disposal occurred over thirty years ago.

53. Lydia Davis
During the cleanup of 126, what will be done to keep contaminated soil & water (if it rains during this time) to keep the "hot spot" runoff from following the natural flow of the ground water or runoff from contaminating down our road – CR 127. The ditch that carries this water crosses 127 through a small culvert & backs up into our east field.

EPA Response

Prior to the initiation of any waste area "hot spot" intrusive soil activities, a Stormwater Pollution Prevention Plan (SWPPP) will be developed, reviewed, and approved by the EPA. The objectives of the SWPPP are to identify the potential sources of runoff from construction activities and to identify the Best Management Practices to be implemented to prevent runoff from the work areas. For example, to prevent runoff from work areas, berms may be constructed around the work areas to control water runoff and erosion.

54.

Vicki & Kerry Sensat

a. We would like our water well tested again (Periodically).

EPA Response

EPA will sample residential wells along CR 126 and very near the site, if requested.

b. Within the last 4 months, a representative from EPC Polymers had our well pulled twice by Greek Water Well Service but we haven't heard any results from testing. The last thing we were told was they may have to redrill our well, but no one has contacted us since. We would like someone to contact us concerning the samples taken & status of our well.

EPA Response

Mr. Bryon Johnson, Project Manager for EPEC Polymers, Inc. was contacted in response to the above request.

c. Is it possible that a community Municipal Water District be created for all the residents in the contaminated area & outlying areas?

EPA Response

Information regarding the requirements for the creation of water districts can be found in Title 30 Texas Administrative Code (30 TAC) Chapter 293 Water Districts, Subchapter B: Creation of Water Districts.

<http://www.tceq.state.tx.us/assets/public/legal/rules/rules/pdf/tib/2933b.pdf>

d. If peripheral damage is done due to equipment & workers coming in & out, who will be responsible? When the augers were in place we had 3 trees fall on a clear windless day. They were drilling on this day.

EPA Response

Those, who cause by their actions, any attributable damage are responsible. In response to falling trees, see response to question 50.

The following general comments on the Amended Proposed Plan were received by the Texas Commission on Environmental Quality (TCEQ) in a letter dated April 25, 2006. Following each general comment is EPA's response.

55. TCEQ General Comment 1

In the TCEQ's view, the average reader of the proposed plan would not be aware that the technical impracticability (TI) waiver of groundwater response objectives, the designation of TI zones, and the implementation of a two-year transitional monitoring period is meant to apply to the West Road Area, Main Waste Area, Easement Area (North and South), and the Office Trailer Area (Central B-53 Area and MW-45 Area, Main Office Trailer Area, and the MW-10 Area) in addition to the other affected areas that are discussed more prominently in the proposed plan. The proposed plan should be amended to make it clearer that the TI waiver process is also intended to apply to these affected areas.

EPA Response

The Amendment Proposed Plan was provided for public review as part of the site's Administrative Record at the start of the public comment period which began on April 12, 2006. It was EPA's intent to convey in the proposed plan that the technical impracticability process would apply to the CR 126 West Area, West Road Area, Main Waste Area, Office Trailer Area (which includes the Central B-53/MW-45 Area and MW-10 Area), and Easement Area. Two sections of the proposed plan did specifically discuss the technical impracticability determination. On page 4 of the proposed plan (Technical Impracticability Determination), the text summarizes the history of remedial operations which took place at the site's Main Waste Area, West Road Area, Office Trailer Area, and Easement Area. The text also discussed the field demonstrated limitations of remediation, estimated costs associated with continuing active remediation operations, and that EPA has determined that restoration of groundwater is technically impracticable. On pages 8 and 9 of the Proposed Plan (CR 126 West Area Technical Impracticability Determination and CR 126 West Area Proposed Remedy), the text included a discussion of the technical impracticability determination made for the CR 126 West and that based on this determination, the proposed treatment of contaminated soils in the CR 126 Area to limit further contamination of the groundwater and actions to insure that there is no direct contact with the contamination.

56. TCEQ General Comment 2

The proposed plan does not accurately summarize the TCEQ understanding of: the performance requirements that are to apply to groundwater within TI zones; and, the manner in which such zones will be designated. The areal extent of the groundwater plumes at the affected areas with chemical of concern (COC) concentrations greater than maximum containment levels (MCLs) have been substantially reduced over the past years through use of groundwater pumping and treatment of the extracted groundwater. According to the discussions during our meeting on March 27, 2006 with EPA and consultants/representatives of responsible parties, the present version of the amended

ROD would not require the companies to maintain the groundwater plumes at their present extent. Instead, the intent is that the plumes must not extend beyond the boundary of a TI zone. As we understood, the boundaries of TI zones are to be determined by estimation of the expansion that will be required for the plume to reach stable conditions due to natural attenuation such that it will no longer be expanding. This process is inconsistent with the following sentences from pages 14 and 17 of the proposed plan that indicate that groundwater plume expansion will not be allowed after the amended ROD is approved:

- a) “For areas designated as Technical Impracticability Zones, the remedial action objective is to maintain stable or declining contaminated groundwater plumes and to prevent exposure to contaminants exceeding the soil and groundwater cleanup criteria.”
- b) “A groundwater monitoring program will be implemented to ensure groundwater plumes are not expanding and down-gradient receptors are not impacted.”

Thus, to pursue this approach, the proposed plan should be revised to more correctly state that the amended ROD will allow the groundwater plumes at the affected areas to expand for an undetermined period until stable conditions are achieved due to natural attenuation and will also require that the groundwater plumes do not expand beyond the TI zone boundaries that have been sized so as to contain the expanded, stable plumes.

EPA Response

In response to the suggestion that the Proposed Plan be revised to more clearly state that the amended ROD will allow the groundwater plumes at the affected areas to expand for an undetermined period until stable conditions are achieved, please note that the Proposed Plan did include a discussion on pages 11 – 12 (Two-Year Transitional Monitoring Period), which stated, “Prior to defining the TI groundwater zones at the site, a two-year transitional monitoring period will occur.” Thus, EPA’s intent is to establish the technical impracticability zones at the completion of the two-year transitional monitoring period.

In response to the suggestion that the Proposed Plan be revised to more clearly state that the amended ROD will also require that the groundwater plumes do not expand beyond the TI zone boundaries that have been sized so as to contain the expanded, stable plumes, please note that the Proposed Plan did include a discussion on page 12 (Contingency Remedies) which addressed potential plume expansion. This section stated that if ground water monitoring results indicate that the extent of ground water contamination is expanding either vertically or horizontally, additional studies will be conducted as necessary to develop and evaluate alternative contingent remedial measures that may be required to address the expanding plume.

57. TCEQ General Comment 3

The TCEQ's Texas Risk Reduction Program (TRRP) rules are sufficiently flexible for Class 2 groundwater to approve a response action similar to the type that EPA is proposing. The TRRP rules contain a similar concept which we refer to as a plume management zone (PMZ). PMZs can involve a limited degree of plume expansion. The primary requirement is that COCs be removed, decontaminated, and/or controlled to the extent necessary such that MCLs are not exceeded at an alternate point of exposure at the hydraulically downgradient boundary of the PMZ. However, even though the TCEQ retains the flexibility to concur with a growth PMZ groundwater response, there are significant data gaps for the affected properties and the draft Amended ROD does not clearly specify the relevant soil and groundwater performance requirements. For example, while designation of the PMZ would require a person to perform an adequate site assessment, we have pointed out several times that the existing data for the affected areas is not adequate to determine the degree of NAPL saturation or NAPL zone extent within the vadose zone and the capillary fringe. One cannot tell how potent of a continuing source the NAPLs in the clay and silt will be and, as a result, one cannot determine an expected degree of COC concentration rebound in the S-1 sand unit. We have also pointed out that a distinction should be made between the groundwater response requirements for the S-1 sand unit versus the S-2 sand unit. Also, a sufficient record of natural attenuation parameter data must be available to verify that COCs in excess of MCLs will not migrate beyond the point of exposure for the PMZ. Typically, we would not approve natural attenuation as a control response unless the plume was at stable conditions or was getting smaller. This type of natural attenuation data is not available for any of the affected areas except for the CR 126 West Area. Also, the draft amended ROD does not adequately describe the company's continuing monitoring, operation and maintenance, and, if necessary, supplemental or alternative response action responsibilities.

EPA Response

In regards to the statement that there are significant data gaps for the affected property, especially in regards to the extent of NAPL (non-aqueous phase liquids), please note the following:

- For the CR 126 West Area, numerous investigations have been by conducted by Lyondell Chemical Company, EPEC Polymers, and by the EPA over the past six years. The soil concentrations present today indicate that there are no recoverable free non-aqueous phase waste liquids, but it is evident based on the shallow ground water concentrations that residual waste constituents remain adsorbed as thin films on the clay and silt that are the predominant soil within the shallow water bearing zone. Following active remediation in this area, two years of transitional monitoring will be conducted to confirm plume conditions and evaluate natural attenuation.
- For the West Road Area, Main Waste Area, Office Trailer Area, and Easement Area, for over 15 years ARCO Chemical Company (which was purchased in 1999 by Lyondell Chemical Company) has been conducting investigations and

remediation activities in these areas. They have installed hundreds of wells and taken literally tens of thousands of soil and groundwater samples. From 1997 until 2005, they had several fulltime contractors onsite conducting active remediation using several technologies. During active remediation, they injected over 100 million gallons of water amended with oxygen and nutrients to enhance bioremediation, and removed thousands of pounds of contaminants from both soil and groundwater. For areas requiring focused remediation, hot spot remedial techniques (i.e., in-situ thermal treatment, excavation) were applied. While NAPL may be present in localized areas of the site, NAPL has never been observed in any of the wells. Any concerns about plume migration will be addressed by Lyondell's transition monitoring. This effort involves over 140 wells and is intended to both confirm the plume conditions (i.e., establish baselines) and evaluate the natural attenuation processes.

- For the Bayou Disposal Area, NAPL has never been suspected based on the numerous soil investigation activities and several years of ground water monitoring.

In regards to the statement that the relevant soil and groundwater performance requirements are not specified, the groundwater cleanup criteria were presented in the Proposed Plan on pages 6 – 7 (Ground Water Cleanup Criteria) and in Table 1 (Ground Water Protection Standards). The soil cleanup criteria were presented in the Proposed Plan on pages 7 – 8 (Soil Cleanup Criteria) and in Table 2 (Soil Remedial Goals).

In regards to the statement that a sufficient record of natural attenuation parameter data must be available to verify that COCs (contaminants of concern) in excess of MCLs (Maximum Contaminant Levels) will not migrate beyond the point of exposure, please note that natural attenuation parameter data is being collected as part of Lyondell's transition monitoring program and that this information will also be collected as part of the monitoring to take place in the CR 126 West Area. In regards to potential receptors, it is important to note that in regards to Lyondell's responsibilities, risk to receptors has been minimized by Lyondell purchasing over 150 acres of land and restriction access to this property. In regards to potential receptors in the CR 126 West Area and Bayou Disposal Area, EPEC Polymers intends to implement deed restrictions consistent with commercial/industrial criteria.

In regards to the continuing monitoring, operation and maintenance, and if necessary, supplemental or alternative response action responsibilities, in regards to Lyondell's activities, this information is included in the *Transitional Monitored Natural Attenuation Plan* (Applied Hydrology Associates, Inc., June 2005). Similar requirements will be developed for CR 126 West Area and Bayou Disposal Area as part of the remedial design activities. Please note that based on existing groundwater monitoring data, further ground water monitoring is not anticipated for the Bayou Disposal Area.

58. TCEQ General Comment 4

The natural attenuation monitoring data for the CR 126 West Area indicate that the groundwater plume with concentrations greater than or equal to MCLs within the S-1 sand unit has been stable for a number of years. Thus, the present groundwater plume extent can be used to define the boundaries of the TI zone within the S-1 sand unit at this affected area. As we previously discussed, the TI zone boundaries within the S-1 sand unit at the other affected areas should not extend beyond the known, historical extent of groundwater with COC concentrations equal to or greater than the relevant PCLs. At this point, EPA should require the companies, during the two-year transitional period, to collect such soil and groundwater assessment/monitoring data to demonstrate for each of their affected area(s) whether monitored natural attenuation will be effective over time in preventing plumes within the S-1 sand unit from migrating beyond the TI zone boundaries and in allowing the S-2 sand unit performance objectives to be attained.

EPA Response

As discussed in the Proposed Plan (Page 11, Two-Year Transitional Monitoring Period), prior to defining the TI groundwater zones at the site, a two-year transitional monitoring period will occur. The goal of the two-year transitional period is to establish groundwater contaminant plume baselines and evaluate the site's natural attenuation processes. A monitoring network will collect contaminant, hydrogeologic and geochemical parameters for evaluation during the transition period. The primary monitoring objective will be to demonstrate that the plumes are stable or declining in nature and that there is no risk to receptors. The monitoring will be performed in conjunction with the establishment of institutional controls to prevent human exposure to contamination exceeding the site's soil and groundwater cleanup goals.

The following comments on the Amended Proposed Plan were received by EPEC Polymers, Inc. in a letter dated May 12, 2006. Incorporated into these comments are EPA's responses.

59. EPEC Polymers, Inc. Comment 1

EPEC Polymers in general concurs with and supports much of the Proposed Plan, including the following specific aspects of the Proposed Plan and the proposed modifications to the 1991 ROD and 1998 Amended ROD:

- a. Documenting a Technical Impracticability (TI) determination by the EPA for the Turtle Bayou Superfund Site including the CR 126 West Area (FWRA – Far West Road Area) as discussed below.
- b. Defining the site to include the 500 acres originally included in the 1991 ROD and expanding the “scope of the remediation” to include the FWRA.
- c. Applying the TI determination to all areas of the Turtle Bayou Site including the Monitor Well MW-109 Area.

- d. Amending the site's ground water cleanup criteria and allowing their refinement based on more rigorous calculations and more appropriate assumptions utilizing Texas or EPA guidance.
- e. Amending the site's soil cleanup criteria to add to the 1998 Amended ROD new "non-residential" criteria for areas that have been or will be deed recorded (as part of the institutional controls required for TI waivers) to limit their use for commercial/industrial purposes. For clarity, it should be noted that EPEC Polymers intends to implement deed restrictions at both the CR 126 West Area and BDA consistent with commercial/industrial criteria. Accordingly, the proposed remedies for the FWRA and BDA will be consistent with the commercial/industrial criteria that will be adopted by the proposed 2006 ROD amendment.
- f. EPEC Polymers agrees with EPA that the construction worker exposure scenario it utilized for calculating a direct contact remediation standard for commercial/industrial areas is conservative and not likely to occur. EPA should instead utilize its standard construction work default assumption (OSWER 9355.4-24, December 2002) that assumes construction workers would only work at the site during a single year and would only work an 8-hour period and not live on the site. It is not likely that utility work would occur annually at the site and it is unlikely that the utility work, if any, would be performed by the same workers.
- g. Identifying the remedy for the CR 126 West Area (FWRA) as described below.
- h. Amending the remedy for the BDA as described below.
- i. Amending the remedy for the Main Waste Area's soils vault (to allow the vault to remain and not be dismantled as long as the following requirements are met: 1) permanent control of property is obtained; 2) long-term ground water monitoring is implemented; 3) fencing; 4) deed restriction is placed on the property; and 5) provide for perpetual maintenance and access to EPA and TCEQ).
- j. Confirming that TI Waiver Zones will be established after a two-year transitional monitoring period.
- k. Identifying contingency remedies and providing for evaluation of contingent options to assess their cost, effectiveness and practicability and whether they may or may not be appropriate for corresponding conditions at the Turtle Bayou Superfund Site.

EPA Response

The following is in response to 1b.

Please note that it in was in the 1998 Record of Decision Amendment that EPA redefined the previous site boundary of approximately 500 acres to include only the contaminated portions of property and all suitable property in very close proximity to the contamination necessary for implementation of the remedial design and remedial action. The areas identified in the 1998 Record of Decision Amendment were the West Road Area, the Main Waste Area, the Office Trailer Area, the Easement Area, the Bayou Disposal Area, and CR 126 (formerly known as Frontier Park Road). This redefinition of the site boundary was based upon information available at the time. Since the 1998 Record of Decision Amendment, two additional areas have been identified – the CR 126 West Area and MW-109 Area. As discussed previously (see response to Question 45), based on how waste was disposed at the site, it is unknown if additional waste disposal areas will be identified in the future. This being the case, the site boundary is reverting to the how it was defined in the 1991 Record of Decision – approximately 500 acres.

The following is in response to 1c.

The EPA has determined, based on years of implementing numerous remedial technologies, various studies, and other factors (i.e., hydrogeologic, contaminant related), that in areas where significant disposal has taken place, complete restoration of contaminated groundwater at the site to the Federal Drinking water standards is technically impracticable.

The following is in response to 1d.

In regards to amending the site's groundwater cleanup criteria, the ground water cleanup criteria were presented in the Proposed Plan on pages 6 -7 (Ground Water Cleanup Criteria) and in Table 1 of the Proposed Plan (Ground Water Protection Standards). The majority of the revised standards are Federal drinking water standards (i.e., MCLs). For other detected contaminants that did not have Federal drinking water standards, the TCEQ has recommended contaminant specific Tier One Protective Concentration Limits. The TCEQ recommends these limits when site-specific information is not available.

The following is in response to 1e.

It is noted that EPEC Polymers, Inc. intends to implement deed restrictions at both the CR 126 West Area and the Bayou Disposal Area consistent with commercial/industrial criteria. Accordingly, the ROD Amendment will be written to indicate that the soil cleanup criteria (either residential or non-residential), will be applied at the specific area of the site based on its current land use. If the current land use was to change from residential to non-residential, the non-residential standards would apply.

The following is in response to 1f.

Since the 1998 ROD Amendment, a significant change in the site's current and anticipated land use has occurred for large portions of the site. Specifically, the site's

West Road Area, Main Waste Area, Office Trailer Area, and Easement Area, residential land use is longer reasonably anticipated. Lyondell Chemical Company has acquired these properties and will restrict access to these areas so that residential use will not occur. In consideration of this fact, additional non-residential direct contact soil cleanup criteria were developed. In developing the new criteria, the EPA and TCEQ considered both TCEQ's Tier 1 Commercial/Industrial Soil Protective Concentration Limits (PCLs) and a site specific exposure evaluation. It was estimated that potential future exposures could result from road utility workers, trespassers, fence construction/maintenance workers, etc. Some of the following assumptions were used in the site specific worker evaluation:

- Worker will be involved in soil intrusive (i.e., digging) activities in impacted soils from 0 –5 feet below ground surface;
- Worker would be digging at the site for 90 days a year for 25 years (conservative assumption – not expected to occur);
- Soil ingestion, inhalation, and dermal exposure pathways were considered;
- Conservative assumptions for soil ingestion and inhalation were used;
- Exposure concentrations were calculated to equate to a 1 in 100,000 chance of developing cancer; and
- For compounds known not to cause cancer (i.e., naphthalene), risk derived soil cleanup concentrations were calculated to estimate values that are unlikely to produce an adverse effect.

In response to EPEC Polymers, Inc. request, the EPA did evaluate the standard construction worker exposure assumptions discussed in EPA's *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (OSWER 9355.4-24, December 2002). Additionally, EPA also evaluated the outdoor worker exposure assumptions, which were also discussed in EPA's guidance document. The following is a summary of these exposure assumptions:

Construction Worker – This is a short-term adult receptor exposed to soil contaminants during the work day for the duration of a single construction project (typically a year or less). If multiple non-concurrent construction projects are anticipated, it is assumed that different workers will be employed for each project.

Outdoor Worker – This is a long-term receptor exposed during the work day who is a full time employee of the company operating on the site and who spends most of the workday conducting maintenance outdoors. The activities for this receptor (e.g., moderate digging, landscaping) typically involve on-site exposures to surface and shallow soils (at depths of zero to two feet).

Exposure default factors used in calculating the soil cleanup criteria for the site specific, construction worker, and outdoor worker are presented in Table 5.

TABLE 5
VARIOUS EXPOSURE FACTORS

Default Exposure Factors	Site Specific Worker	Construction Worker	Outdoor Worker
Exposure Frequency (days/year)	90	250	225
Exposure Duration (years)	25	1	25
Soil Ingestion Rate (milligrams/day)	360	330	100
Inhalation Rate (cubic meters/day)	30	20	20
Body Weight (kilograms)	70	70	70
Lifetime (years)	70	70	70

Using the various exposure factors presented above, soil cleanup criteria were calculated to equate to a 1 in 100,000 chance of developing cancer. These calculated soil cleanup criteria values, in addition to the TCEQ's Tier 1 Commercial/Industrial PCLs and the Proposed Plan Non-Residential Soil remedial goals are present in Table 6 below:

TABLE 6
CALCULATED SOIL CLEANUP GOALS

Contaminant	TCEQ Tier 1 Commercial Industrial PCL (mg/kg)	EPA Site Specific Worker Scenario		EPA Construction Worker (mg/kg)	EPA Outdoor Worker (mg/kg)	EPA Proposed Plan (mg/kg)
		Inhalation + Ingestion (mg/kg)	Inhalation + Ingestion + Dermal (mg/kg)			
Benzene	37	40	36	175	26	36
Vinyl Chloride	12	8.9	6	86	6	10
Naphthalene	190	375	375	375	375	190
Lead	1600	800	800	NC	NC	800

Notes: For lead, the US EPA Region 6 uses a soil lead concentration limit of 800 mg/kg for industrial workers.
mg/kg - milligrams/kilograms
NC - Not Calculated
For naphthalene – the saturation concentration is 375 mg/kg.

As can be seen in Table 6 above, using various exposure factors resulted in various calculated soil cleanup goals. Using EPA's construction worker exposure assumptions resulted in soil cleanup criteria which are greater than that which was presented in the Proposed Plan. Using the outdoor worker exposure assumptions resulted in soil cleanup criteria for benzene and vinyl chloride which are less than that which was presented in the Proposed Plan. It is important to note that in selecting the soil cleanup criteria, the EPA considered the fact that not all the chemicals known to be present at the site were evaluated in developing the soil cleanup criteria and that there are residents (adults and children) present at the site. In addition, the soil cleanup numbers were selected taking into consideration the potential for contaminant release to groundwater. The EPA, in consultation with the TCEQ, has decided to use the non-residential soil cleanup criteria that were presented in the proposed plan.

60.

EPEC Polymers, Inc. Comment 2

The Proposed Plan discusses the TI Demonstrations completed on behalf of Lyondell and EPEC Polymers and discusses the remedial activities to date for the Main Waste Area, West Road Area, Office Trailer Area, and Easement Area and the natural attenuation to date. The plan observes that it has been estimated that it would take up to 160 years and cost \$80 million to reach the site's cleanup criteria and states that EPA has made a determination that restoration of the ground water is technically impracticable and ARARs "will be waived for designated portions of the site". Specific language should be included in the ROD Amendment that EPA has made a similar determination for the entire Turtle Bayou Superfund Site based on two TI demonstration studies and the consistency of the original Remedial Investigation site characterization and the supplemental studies since. The site conditions and nature of the wastes and limitations of available remedial technologies would; therefore, apply to the site as a whole including the MW-109 Area where the investigations to date have documented that residual waste material from the wastes disposed between 1969 and the mid 1970s is found within the clays and silts and, therefore, their removal via extraction or injection technologies would be limited by diffusion. It is evident that it is not cost-effective to attempt to excavate and remove all affected soil. It is also evident that ground water remediation is not cost-effective since once remediation is terminated the constituent concentrations in the ground water will rebound to near pre-remediation levels as long as a substantial portion of the residual waste materials are found in the overlying clays and silts. Therefore, it is not technically practical to achieve the ground water protection criteria for the site as a whole.

EPA Response

The EPA has been determined, based on years of implementing numerous remedial technologies, various studies, and other factors (i.e., hydrogeologic, contaminant related), that in areas where significant past waste disposal has taken place, complete restoration of contaminated groundwater at the site to the Federal Drinking water standards is technically impracticable. In regards to the MW-109 Area, data indicates that the area of groundwater contamination is limited (based on the results of groundwater sampling conducted in surrounding permanent and temporary wells).

Additional studies are being planned to further evaluate the extent of soil contamination in this area. An evaluation of all MW-109 information will be used to determine if remedial action is required to address the contamination. If remedial action is required, it will be documented in a subsequent EPA decision document. Consideration of what has been learned at the site will certainly focus EPA's efforts in identifying an appropriate remedy. Because the same conditions which prohibit complete restoration of ground water to the Federal drinking water standards in other areas of the site are also present in the MW-109 Area (i.e., hydrogeologic, contaminant related), it is also not technically practicable to achieve the ground water protection in the MW-109 Area.

61. EPEC Polymers Inc., Comment 3

Mr. Roger Lee of the U.S. Geological Survey reviewed the TI Demonstration and Natural Attenuation Assessment for the FWRA and concluded that natural attenuation has been effective at limiting plume migration in both the S1 and S2 Sands and that the plumes in these sands are stable. Mr. Lee also recommended against active remediation or control measures in the S2 to avoid interfering with the natural biological controls that have proven effective. EPEC Polymers concurs with Mr. Lee and disagrees with comments from the TCEQ that might be read to imply that the ROD remedy for the FWRA should include active "removal, remediation, or controls." In further discussion with the TCEQ, EPEC Polymers understands that the active remediation and treatment proposed for the most affected soils overlying the S2 Sand in the FWRA will satisfy the TCEQ's desires since the proposed remedy will in the long run reduce the mass flux into the S2 Sand.

EPA Response

The EPA recognizes that natural biological controls present at the site will contribute to the long-term remedial action objective of maintaining stable or declining contaminated ground water plumes. Ground water sampling will be required to verify the status of ground water plumes. If after the completion of the two-year transitional monitoring period and subsequent designation of the TI groundwater zones, ground water monitoring indicates that the extent of the ground water contamination is expanding either vertically or horizontally beyond the TI zones, additional studies will be conducted as necessary to develop and evaluate contingency measures which may be required to address the expanding plume. Contingent measures will be determined in part based on the rate of migration and contaminant mass that has migrated from the area.

62. EPEC Polymers Inc. Comment 4

Monitoring in the FWRA for both the S1 and S2 Sands has occurred since 1999 and ample data exist to demonstrate that natural attenuation has limited plume migration. The 2006 Amended ROD should, therefore, provide that ground water monitoring will be reduced in frequency to annually after two more years of quarterly monitoring unless EPA determines that the quarterly monitoring indicates more frequent monitoring is necessary. It should also state that annual monitoring will be reduced in frequency after

year five to monitoring every five years unless EPA determines that the annual monitoring indicates that more frequent monitoring is necessary. Since the data to date as verified by Mr. Lee's evaluations indicate plume stability in the FWRA, it is not necessary for an open-ended period of more frequent monitoring. In the interests of being cost-effective and providing efficiency in the process, the ROD should allow for the automatic reduction in the frequency of monitoring unless EPA makes a determination otherwise.

EPA Response

EPA concurs that the proposed frequency for ground water monitoring is sufficient, unless EPA's evaluation of the data indicates more frequent sampling is required.

63.

EPEC Polymers, Inc. Comment 5

The Proposed Plan provides an overview of the discovery and investigations of the FWRA. The plan notes that "Additional investigations have been performed in 2005 ...on behalf of EL PASO Energy." The proper entity name is EPEC Polymers, Inc.; please correct this error. The Proposed Plan also states that "The field pilot study demonstrated that the ISCO mechanical auger soil mixing technique is effective at liquefying the clayey soil and achieving a small clod size...is capable of auger mixing to a depth of 25 feet...and is capable of injecting a chemical oxidant solution." The ROD should also mention that the previous site-specific bench-scale testing documented in the December 2, 2005 Supplemental Site Investigation, the available data in the technical literature, and recent pilot test data (provided under separate cover) demonstrate the effectiveness of oxidation of the site COCs.

EPA Response

The ROD Amendment will identify EPEC Polymers Inc. as the entity responsible for conducting additional investigations in 2005. The ROD Amendment will also mention the site-specific bench scale testing and field pilot test.

64.

EPEC Polymers, Inc. Comment 6

The plan states that "EPA" is continuing to evaluate the area around MW-109." Adequate studies have been completed by both EPEC Polymers and Lyondell that demonstrate the applicability and effectiveness of natural attenuation at the site. EPA should, therefore, identify natural attenuation as the remedy for the MW-109 Area and specify natural attenuation parameters as well as site COCs as part of its proposed monitoring for the MW-109 Area.

EPA Response

See response to comment 60.

65. EPEC Polymers, Inc. Comment 7

The plan states that the site COCs for which ground water cleanup criteria are proposed “were detected at elevated concentrations in the CR 126 West Area”. It should be noted that these COCs were also found at multiple disposal locations elsewhere at the Turtle Bayou Superfund Site.

EPA Response

The contaminants detected in the CR 126 West Area were not exclusive to this area but were in fact found in multiple locations throughout the site.

66. EPEC Polymers, Inc. Comment 8

The plan includes a section entitled “CR 126 West Area Technical Impracticability Determination” (on page 8) that provides a summary of the EPEC Polymers’ TI Demonstration. This language should be augmented to include the explicit statement that “EPA has determined that it is technically impracticable to clean up the FWRA.” The text says that three factors (hydrogeologic, contaminant related, and remediation system inadequacies) “work to preclude the timely cleanup of contaminated ground water” and that “As has been demonstrated by the remedial efforts that has (sic) taken place in other areas of the site, the combination of... (these) factors have limited the effectiveness of numerous remedial approaches to attaining complete restoration of contaminated soils and the underlying aquifers.

EPA Response

The ROD Amendment will state that the EPA has determined, based on years of implementing numerous remedial technologies, various studies, and other factors (i.e., hydrogeologic, contaminant related), that in areas where disposal has taken place, including the CR 126 West Area, MW-109 Area, West Road Area, Main Waste Area, Office Trailer Area, and Easement Area, complete restoration of contaminated groundwater to the Federal Drinking water standards is technically impracticable.

67. EPEC Polymers, Inc. Comment 9

The remedy for the FWRA is described as including several elements; please note that the description includes “artifact” language from a draft Remedial Action Plan for the FWRA that referred to two different options at the time under consideration for the FWRA, one of which included excavation as an element of the FWRA remedy. To avoid confusion the description should be revised in the ROD amendment to eliminate references to excavation in the context of the FWRA.

EPA Response

The ROD Amendment will include a discussion of the selected remedy for the FWRA. Excavation will not be included as a remedy component for the FWRA.

68. EPEC Polymers, Inc. Comment 10

The amendment to the ROD should describe the proposed remedy as entailing:

- a. The use of augers to mix soils in a central area of the FWRA “to a depth of 25 feet with a chemical oxidant” to treat the most affected soils and a portion of the S1 shallow zone and “using lime, cement, or fly ash to strengthen the soils”.
- b. Please note that the remediation area may vary from that shown on Figure 4, based on recent discussions regarding the need for additional sampling. Therefore, the ROD should simply reference that the central disposal areas in the FWRA will be treated.
- c. Please also note that the description of the air emission control should be revised from that stated. Instead of installing a temporary cover with an exhaust system to capture vapors that “would cover the excavation (sic) area or cover the bottom of the augers used for ISCO via mechanical soil mixing,” the text should refer to a “a vapor capture system that will route vapors from the auger mixing to a treatment or adsorption system (such as thermal oxidizer or activated carbon).”
- d. The reference to “installing security fencing around the area” should be revised to refer to installing temporary security fencing around the active remediation area (to avoid) the impression that permanent fencing will be constructed around the FWRA); it is evident that such fencing is not aesthetically desirable based on public comments during the public meeting and is not necessary given the conservation nature of the exposure scenarios evaluated by EPA.
- e. Temporary rerouting or replacing the country road around the “excavation (sic)/treatment area” should be revised to omit the reference to excavation.
- f. “Placing temporary berms along the up gradient side of the central source area and/or using a staggered remediation approach to reduce the amount of storm water to be managed as contact water” should be revised to refer only to “temporary berms around the active remediation area” (omitting the reference to staggered remediation).
- g. Omit the word “long-term” from the reference to “Hydro-mulch seeding of the disturbed area to provide long-term erosion control.” Hydro-mulching is a short-term erosion control measure and the natural ability of the area to re-vegetate as has occurred throughout the site will provide long-term erosion control.
- h. “Completing a new roadway round the area” should be revised to refer to “a new roadway after active remediation has been completed.”
- i. “Implementing institutional controls through either obtaining property ownership or restrictive covenants for the property necessary to implement the remedy and protect human health and the environment. Restrictions will be placed that will prohibit the installation of drinking water wells that may contribute to plume movement or result in exposure. The restrictions will also prohibit excavations in the CR 126 West Area without prior approval. The area(s) in which restrictions regarding drinking water wells or prohibition of excavation are to be placed are not shown or described. A reference should be made that these restrictions will be instituted within the areas defined as the CR 126 West and BDA and to the extent practicable outside of these areas within a

distance of 1000 feet. It will not be necessary to purchase all ground water rights or institute ground water use restrictions throughout the target area outside the current plume as long as long-term monitoring is performed since the monitoring will provide an early warning system that ground water use outside of the remediation areas is influencing plume migration. Such monitoring will provide ample time to address the situation before exposure occurs.

EPA Response

The following is in response to 10d

If residual contamination remains in areas at levels that would preclude unrestricted use, institutional controls will be required to limit potential exposure to affected ground water and soil.

69.

EPEC Polymers, Inc. Comment 11

The section on the remedy amendment for the BDA on pages 9-11 includes discussion of the past remedy, the recent Tetra Tech investigation, and identifies the following constituents as exceeding EPA Region 6 medium-specific screening levels (MSSLs) for residential soil: benzene, methyl chloride, benzo(a)pyrene, arsenic, and iron. It notes that “VOCs have not been detected above their Federal drinking water standards in the last four sampling rounds” as shown on Table 3 attached to the plan. It states that based on these sampling results EPA is proposing a new remedy for the BDA. We recommend the following changes to the description of the proposed remedy:

- a. Revise the statement that “Limited Excavation of up to 300 cubic yards...to reduce the mass of residual waste constituents that could diffuse into the shallow ground water” to eliminate the phrase “that could diffuse into the shallow ground water” and add “if necessary to achieve commercial/industrial criteria based on a statistical evaluation utilizing a 95% confidence level based on the existing data.”
- b. “Off-site disposal of the excavated soils” can be modified to add “at a permitted treatment facility.
- c. No change to “Run-off and run-on control and hydro-mulching as may be warranted to address potential erosion.”
- d. “Plugging or conversion of nearby water wells into monitoring wells.” We suggest that EPA modify this to refer to the “three” nearest private wells.
- e. Omit the reference to fencing by deleting the words “and fencing” in the following based on the public comments at the April 17, 2006 public meeting: “Institutional controls and fencing to limit potential exposure to affected ground water and soil.”

EPA Response

The following is in response to 11d

The water wells referred to include the water wells presently located on the Bayou Disposal Area and potentially those wells located on nearby properties.

70. EPEC Polymers, Inc. Comment 12

The section entitled “TWO-YEAR TRANSITIONAL MONITORING PERIOD” should be revised as follows:

- a. Omit the phrase “occurring in the aquifer” and add the words “where stability has not yet been demonstrated (i.e., where active remediation of ground water was recently discontinued)” in the following discussion: “Prior to defining the TI groundwater zones at the site, a two-year transitional monitoring period will occur. The goal...is to establish the...plume baselines for evaluate (sic) the natural attenuation processes”...”Evaluation of this information will lead to a better understanding of natural biodegradation processes [omit “occurring in the aquifer”] and their effect on further contaminant reduction. The primary ... objective will be to demonstrate that the plumes are stable or declining in nature [insert: “where stability has not yet been demonstrated (i.e., where active remediation of ground water was recently discontinued)”] and that there is no risk to receptors...It is anticipated that the TI zones will encompass the historical extent of the ground water plumes.”

EPA Response

The two year monitoring program has already begun in West Road Area, Main Waste Area, Office Trailer Area, and Easement Area. Following completion of the active remedy implementation in the CR 126 West Area, a two-year monitoring program will begin in this area. Additional ground water monitoring in the Bayou Disposal Area is not planned.

71.

EPEC Polymers, Inc. Comment 13

The section entitled “DESCRIPTION OF SIGNIFICANT DIFFERENCES AND NEW ALTERNATIVES” states the following should be revised as noted below:

- a. As currently worded the plan states that the proposed ROD Amendment will expand the definition of the site to include CR 126 West Area and the area around MW-109. It should say that the definition of the Superfund Site will be expanded to encompass 500 acres of the original 1991 ROD.
- b. Under the subtitle “TREATMENT COMPONENTS”, the plan states that the preferred treatment alternative for the CR 126 West Area is ISCO mechanical auger soil mixing to “limit the amount of contaminants reaching the ground water.” In a separate paragraph that does not specifically mention the CR 126 West Area it states that in regards to TI waiver zones (plural), if monitoring indicates “that the extent...is expanding, additional contingent TREATMENT components may be required to address the expanding plume.” EPEC Polymers agrees with the trigger of an expanding plume but objects to the implied requirement that any contingent response includes treatment. There is no reason to include further treatment if it will not be effective.

c. On page 14 under the subtitle “REMEDIAL OBJECTIVES” the plan states that “As discussed in the Proposed Plan, restoration of the impacted ground water and overlying soils has been determined to be technically impracticable.” The context of this statement if not stated but should be revised to clearly indicate that the context is to the Superfund Site in its entirety, consistent with the subsequent text that states in reference to the site in general: the “..remedial objectives will be modified as follows.”

- For areas designated at TI Zones, the “objective is to maintain stable or declining...plumes and to prevent exposure to contaminants exceeding the soil or ground water cleanup criteria.”
- For areas outside of TI Zones, the “remedial goal” is to protect the ground water from degradation....”

d. On page 15, it is noted that there has been a significant change in the current and anticipated land use where Lyondell has purchased property. “In these areas, residential land use will be precluded. Also in these areas, use of the property will be tightly restricted. In the CR 126 West Area, the proposed remedy is dependent on the ability to institute similar controls.” EPEC takes exception to this statement, since it suggests that institutional controls cannot be implemented successfully in this area. EPEC Polymers had already initiated contacts with landowners regarding sale or deed restrictions that allow EPEC Polymers to purchase the properties or ground water rights and/or provide land use restrictions assuming EPA and EPEC Polymers execute a mutually agreeable Consent Decree.

EPA Response

The following is in response to 13a

See response 59-1b.

The following is in response to 13b

If ground water monitoring results indicate that the extent of ground water contamination is expanding, additional contingency measures may be required to address the expanding plume. Such contingent measures may include one or more of the following:

- Plugging of wells and installation of replacement wells;
- Monitored natural attenuation;
- Ground water pumping potentially with in situ bioremediation (e.g., via nutrient injection);
- In situ ground water sparging or air stripping;
- The injection of nutrients to enhance natural attenuation;
- Additional excavation and/or in situ chemical oxidation to reduce contaminant mass; or

- Installation of a slurry wall, reactive barrier, horizontal grouting, or other containment structure.

Any contingent response to be implemented will be determined based on the rate and contaminant mass that has migrated from the area.

72.

EPEC Polymers, Inc. Comment 14

In the section entitled “EVALUATION OF ALTERNATIVES”, the various remediation areas are discussed under subheadings that correspond to EPA’s nine evaluation criteria.

- a. The TI Waiver language makes reference “For areas designated technical impractical zones.” Again the plan to create specifically a TI Zone in the CR 126 West Area is not explicit and the language should be modified to explicitly include the CR 126 West Area as an area where a TI waiver will be established.

- b. In the context of the Lyondell remediation areas the statement is made that “The evaluations did find that monitored natural attenuation should be sufficient to prevent plume expansion beyond the areas previously impacted.” There should be a similar statement that natural attenuation has been demonstrated to be effective in creating plume stability in the CR 126 West Area and that indicates EPA agreement that natural attenuation in the CR 126 West Area is sufficient to prevent migration in the future for both the S1 and S2 Sands.

EPA Response

The following is in response to 14b

The EPA recognizes that natural attenuation at the site will contribute to the long-term remedial action objective of maintaining stable or declining contaminated ground water plumes. Ground water monitoring will be required to verify that the ground water plumes are not expanding and that down-gradient receptors are not impacted.

73.

EPEC Polymers, Inc. Comment 15

The section entitled “SUMMARY OF THE PREFERRED ALTERNATIVE” makes reference to four areas: CR 126 West, BDA, Main Waste Area Vault, and “TI areas”. The plan summary should be modified to note that:

- a. Mechanical auger mixing with ISCO is the preferred remedy for the CR 126 West Area because natural attenuation and plume stability have been demonstrated in the CR 126 West Area.
- b. Omit the statement that “Contaminated soil identified in the site’s Bayou Disposal Area that exceeded the remedial goals will be excavated and

disposed of offsite” to read that “Up to 300 cubic yards of soil will be excavated and disposed of offsite at a permitted treatment facility as necessary to statistically achieve the commercial/industrial remedial goals in accordance with EPA’s guidance for ascertaining compliance with cleanup goals. EPEC does not propose to excavate more than 300 cubic yards of soil and dispose of it at a permitted treatment facility.

- c. The TI language is “A determination has been made that attainment of the site’s remedial action goals is technically impracticable for AREAS of the site.” Again the reference is general and should specifically reference the FWRA as well as the entire site for clarity.

EPA Response

The following is in response to 15a

Mechanical auger mixing with ISCO is the preferred remedy for the CR 126 West Area because it has been demonstrated to be effective at treating site-specific contaminants.

74.

EPEC Polymers, Inc. Comment 16

No mention is made of what would be required in terms of performance standards or soils sampling before or after the remedy or in the context of verifying that soils meet the commercial/industrial or residential standards. The ROD should specifically note that sufficient sampling has been completed in the CR 126 West Area and BDA to document where commercial/industrial remedial goals have been achieved and that no additional pre- or post-remedy sampling for this purpose is necessary even if a residential use scenario applies.

EPA Response

The soil performance standards were presented on pages 7 - 8 of the proposed plan and in Table 2 (attached to the Proposed Plan). In regards to the verification of soil performance standards, sufficient data must be presented to document whether soil chemical concentrations are statistically below a cleanup standard or ARAR. If it can be reasonably concluded that the remaining soil or treated soil at a site has concentrations that are statistically less (e.g., utilizing a 95% confidence level) than the relevant cleanup standards then the site can be judged to be protective of human health and the environment. EPA’s guidance document, *Methods for Evaluating the Attainment of Cleanup Standards Volume 1: Soils and Solid Media* (EPA 230/02-89-042, February 1898), describes methods for testing whether soil chemical concentrations at a site are statistically below a cleanup standard or ARAR.

75.

EPEC Polymers, Inc. Comment 17

The tables and figures for the ROD should be modified. The Proposed Plan’s attached tables include only some of the S1 Wells and no S2 Wells and no boring locations were shown on the FWRA figure. To illustrate the extent of the investigation efforts to date the tables and figures should be more comprehensive in their scope similar to the figure for the BDA.

EPA Response

The Record of Decision will include more detailed information than was presented in the Proposed Plan. Additionally, the Administrative Record includes documents that the EPA considered or relied on in selecting the response action at the site.

76. EPEC Polymers, Inc. Comment 18

Based upon the work that EPEC Polymers and others have completed, as documented in the Supplemental Site Investigation/Alternative Evaluation Report (SSI-AER), the Supplemental Data Report (SDR), the Technical Impracticability Demonstration, and the CR 126 West Area Remedial Action Plan, the nature and extent of affected media in the CR 126 West Area is well characterized. During the course of completing numerous borings and monitor wells and of sampling ground water since 1999, there has been no visual or other direct evidence for the presence of residual and/or recoverable NAPL in the CR 126 West and the relative COC levels in the surficial soils have been well characterized; no further sampling for this purpose is necessary in the CR 126 West Area. Given the extensive site investigation activities in the area, EPA should include a statement in the 2006 ROD amendment that EPA has concluded there is no need for additional site investigation activities or sampling as part of the remedy for the purpose of determining what areas meet the proposed soil cleanup goals in either the FWRA or the BDA.

EPA Response

See response to comment 74.

77. EPEC Polymers, Inc. Comment 19

Relative to the FWRA, EPA may wish to make reference to Figures 2-1 through 2-5 from the SSI/AER to illustrate the location of over 200 soil borings, soil gas probe borings, CPT borings, MIP borings, and monitor wells that have been completed in the CR 126 West Area. As part of this field effort, approximately 1000 soil and ground water samples have been collected and analyzed for constituents of concern. Numerous maps illustrating the extent of affected media are provided in the above referenced reports.

EPA Response

See response to comment 75.

78. EPEC Polymers Comment 20

Relative to the BDA, Tetra Tech EM on behalf of the EPA developed and implemented a random, stratified sampling that—when combined with the data from the previous EPA investigation and investigations by others—provides ample data for characterizing the mean COC concentrations in the BDA and eliminate the need for future sampling to assess attainment with the residential or commercial/industrial remedial goals in the BDA.

EPA Response

See response to comment 74.

RECORD OF DECISION AMENDMENT

**PETRO-CHEMICAL SYSTEMS, INC.
(TURTLE BAYOU)
SUPERFUND SITE**

**REGION 6
SEPTEMBER 2006**

APPENDIX C

Prepared for

United States Environmental Protection Agency

Region 6

**AMENDED RECORD OF DECISION
ADMINISTRATIVE RECORD INDEX**

for

**PETRO-CHEMICAL SYSTEMS INCORPORATED (TURTLE BAYOU)
SUPERFUND SITE**

EPA ID No. TXD980873350

GS09K99BHD0010

Task Order No. T0703BG1026

**Chris Villarreal
Remedial Project Manager
U.S. EPA Region 6**

Prepared by

**Science Applications International Corporation
555 Republic Drive, Suite 300
Plano, TX 75074**

September 22, 2006

PREAMBLE

The purpose of this document is to provide the public with an index to the Administrative Record File (AR File) for the U.S. Environmental Protection Agency's (EPA) selected remedial action to respond to conditions at the Petro-Chemical Systems Incorporated Superfund Site (the "Site"). This administrative index supplements the Administrative Records for the Record of Decision documents dated March 27, 1987, September 6, 1991, April 1, 1998, and the Remedial Administrative Record dated April 12, 2006; EPA's action is authorized by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. Section 9601 et seq.

Section 113 (j)(1) of CERCLA, 42 U.S.C. Section 9613 (j)(1), provides that judicial review of the adequacy of a CERCLA response action shall be limited to the Administrative Record (AR). Section 113 (k)(1) of CERCLA, 42 U.S.C. Section 9613 (k)(1), requires the EPA to establish an AR upon which it shall base the selection of its remedial actions. As the EPA decides what to do at the site of a release of hazardous substances, it compiles documents concerning the site and it's decision into an "AR File." This means that documents may be added to the AR File from time to time. After the EPA Regional Administrator or the Administrator's delegate signs the Action Memorandum or the Record of Decision memorializing the selection of the action, the documents which form the basis for the selection of the response action are then known as the Administrative Record "AR."

Section 113(k)(1) of CERCLA requires the EPA to make the AR File available to the public at or near the site of the response action. Accordingly, the EPA has established a repository where the AR File may be reviewed near the Site at:

Liberty Public Library
1710 Sam Houston, Liberty, TX 77575
Telephone: (409) 336-8901
Contact: Ms. Dana Absher

and

Texas Commission on Environmental Quality
Community Relations Section
12100 Park 35 Circle
Austin, Texas
Contact: Joe Shields
Telephone: (512) 239-2463 or (800) 633-9363

The public also may review the AR File at the EPA Region 6 office in Dallas, Texas, by contacting the Remedial Project Manager at the address listed below. The AR File is available for public review during normal business hours. The AR File is treated as a non-circulating reference document. Any document in the AR File may be photocopied according to the procedures used at the repository or at the EPA Region 6 office. This index and the AR File were compiled in accordance with the EPA's Final Guidance on Administrative Records for Selecting CERCLA Response Actions, Office of Solid Waste and Emergency Response (OSWER) Directive Number 9833.3A1 (December 3, 1990).

Documents listed as bibliographic sources for other documents in the AR File might not be listed separately in the index. Where a document is listed in the index but not located among the documents which the EPA has made available in the repository, the EPA may, upon request, include the document in the repository or make the document available for review at an alternate location. This applies to documents such as verified sampling data, chain of custody forms, guidance and policy documents, as well as voluminous site-specific reports. It does not apply to documents in EPA's confidential file. (Copies of guidance documents also can be obtained by calling the RCRA/Superfund/Title 3 Hotline at (800) 424-9346.)

These requests should be addressed to:

Chris Villarreal
Remedial Project Manager
U.S. EPA Region 6
1445 Ross Avenue
Dallas, Texas 75202-2733
(214) 665-8529

The EPA response selection guidance compendium index has not been updated since March 22, 1991 (see CERCLA Administrative Records: First Update of the Compendium of Documents Used for Selecting CERCLA Response Actions [March 22, 1991]); accordingly, it is not included here. Moreover, based on resource considerations, the Region 6 Superfund Division Director has decided not to maintain a Region 6 compendium of response selection guidance. Instead, consistent with 40 CFR Section 300.805(a)(2) and 300.810(a)(2) and OSWER Directive No. 9833.3A-1 (page 37), the AR File Index includes listings of all guidance documents which may form a basis for the selection of the response action in question.

The documents included in the AR File index are arranged predominantly in chronological order. The AR File index helps locate and retrieve documents in the file. It also provides an overview of the response action history. The index includes the following information for each document:

- **Doc ID**- The document identifier number.
- **Date** - The date the document was published and/or released. "01/01/2525" means no date was recorded.
- **Pages** - Total number of printed pages in the document, including attachments.
- **Title** - Descriptive heading of the document.
- **Document Type** - General identification, (e.g. correspondence, Remedial Investigation Report, Record of Decision.)
- **Author** - Name of originator, and the name of the organization that the author is affiliated with. If either the originator name or the organization name is not identified, then the field is captured with the letters "N/A".
- **Addressee**- Name and affiliation of the addressee. If either the originator name or the organization name is not identified, then the field is captured with the letters "N/A".

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD****Site Name:** PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU**CERCLIS:** TXD980873350**OUID:** OU2**SSID:** 81**Action:** AMENDED RECORD OF DECISION**Docid:** 900168**Bates:** 000001**To:** 000057**Date:** 03/27/1987**Pages:** 57**Title:** RECORD OF DECISION REMEDIAL ALTERNATIVE SELECTION FOR PETRO-CHEMICAL SYSTEMS, PHASE I, FRONTIER PARK ROAD**Doc Type:** RECORD OF DECISION / AMENDMENT**Name****Organization****Author:** LAYTON JR., ROBERT E

U.S. ENVIRONMENTAL PROTECTION AGENCY

Name**Organization****Addressee:** NONE,

NONE

Docid: 1014771**Bates:** 000058**To:** 000257**Date:** 09/06/1991**Pages:** 200**Title:** RECORD OF DECISION FOR PETRO-CHEMICAL SYSTEMS INCORPORATED**Doc Type:** RECORD OF DECISION / AMENDMENT**Name****Organization****Author:** NONE,

U.S. ENVIRONMENTAL PROTECTION AGENCY

Name**Organization****Addressee:** NONE,

NONE

Docid: 199115**Bates:** 000257.001**To:** 000257.029**Date:** 09/01/1993**Pages:** 29**Title:** GUIDANCE FOR EVALUATING THE TECHNICAL IMPRACTICABILITY OF GROUND-WATER RESOTRATION - INTERIM FINAL**Doc Type:** FACTSHEET**Name****Organization****Author:** NONE,

U.S. ENVIRONMENTAL PROTECTION AGENCY

Name**Organization****Addressee:** NONE,

NONE

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 137907

Bates: 000258

To: 000355

Date: 04/01/1998

Pages: 98

Title: RECORD OF DECISION AMENDMENT FOR PETRO-CHEMICAL SYSTEMS

Doc Type: RECORD OF DECISION / AMENDMENT

Name

Organization

Author: NONE,

U.S. ENVIRONMENTAL PROTECTION AGENCY

Name

Organization

Addressee: NONE,

NONE

Docid: 100023

Bates: 000356

To: 000360

Date: 04/30/1998

Pages: 5

Title: [RECORD OF DECISION AMENDMENT - APPENDIX A TO THE CONSENT DECREE FOR
PETRO-CHEMICAL SYSTEMS]

Doc Type: RECORD OF DECISION / AMENDMENT

Name

Organization

Author: NONE,

U.S. ENVIRONMENTAL PROTECTION AGENCY

Name

Organization

Addressee: NONE,

NONE

Docid: 137908

Bates: 000361

To: 000398

Date: 04/30/1998

Pages: 38

Title: RECORD OF DECISION AMENDMENT FOR PETRO CHEMICAL / TURTLE BAYOU SITE
OPERABLE UNIT 2

Doc Type: RECORD OF DECISION / AMENDMENT

Name

Organization

Author: NONE,

TEAM, INCORPORATED

Name

Organization

Addressee: NONE,

U.S. ENVIRONMENTAL PROTECTION AGENCY

ADMINISTRATIVE RECORD

Action: AMENDED RECORD OF DECISION

NONE

NONE

Page 3 of 46

ADMINISTRATIVE RECORD

Action: AMENDED RECORD OF DECISION

Doc Type: CORRESPONDENCE

U.S. ENVIRONMENTAL PROTECTION AGENCY

Doc Type: MEMORANDUM

TEXAS NATURAL RESOURCE CONSERVATION
COMMISSION

Doc Type: MEMORANDUM

NONE

09/22/2006

ADMINISTRATIVE RECORD

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU)
CERCLIS: TXD980873350
OUID: OU2
SSID: 81
Action: AMENDED RECORD OF DECISION

Docid: 900207
Bates: 000623
Date: 04/13/2000
Pages: 38

Title: [GROUND WATER SAMPLING TRIP REPORT (RAC) FOR REMEDIAL ENFORCEMENT
OVERSIGHT AND NONTIME-CRITICAL ACTIVITIES FOR MARCH 22 AND 23, 2000]

Doc Type: CORRESPONDENCE

Name	Organization
Author: CZECHOWSKI, DOUGLAS A	TETRA TECH EM INCORPORATED
Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 143317
Bates: 000661
Date: 06/13/2000
Pages: 5

Title: [ANALYTICAL RESULTS FOR SOIL AND GROUNDWATER SAMPLES COLLECTED FROM THE
FAR WEST ROAD AREA AT THE LYONDELL TURTLE BAYOU PROJECT]

Doc Type: E-MAIL MESSAGE

Name	Organization
Author: JAROS, ROB	REMEDIAL OPERATIONS GROUP INCORPORATED
Addressee: SLOAN, DICK	NONE

Docid: 145528
Bates: 000666
Date: 06/27/2000
Pages: 81

Title: REMEDIAL DESIGN / REMEDIAL ACTION OVERSIGHT - COMBINED QUALITY ASSURANCE
PROJECT PLAN AND FIELD SAMPLING PLAN FOR COUNTY ROAD 126 WEST AREA
SURFACE WATER AND GROUND WATER SPLIT SAMPLING

Doc Type: WORK PLAN / AMENDMENT

Name	Organization
Author: GARCIA, MATT B	TETRA TECH EM INCORPORATED
Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY

ADMINISTRATIVE RECORD

CERCLIS: TXD980873350

SSID: 81

Action: AMENDED RECORD OF DECISION

ADMINISTRATIVE RECORD

Date: 07/12/2000

Title: [GROUND WATER SAMPLING TRIP REPORT (RAC) FOR REMEDIAL, ENFORCEMENT, OVERSIGHT, AND NONTIME-CRITICAL REMOVAL ACTIVITIES FOR 06/27/2000]

Author: CZECHOWSKI, DOUGLAS A

Addressee: VILLARREAL, CHRIS

Organization
TETRA TECH EM INCORPORATED
Organization

U.S. ENVIRONMENTAL PROTECTION AGENCY

Bates: 000781

Date: 07/18/2000

Title: [SURFACE WATER AND GROUND WATER SPLIT SAMPLING (RAC) FOR REMEDIAL, ENFORCEMENT, OVERSIGHT, AND NONTIME-CRITICAL REMOVAL ACTIVITIES FOR 06/28/2000]

Author: GARCIA, MATT B

Addressee: VILLARREAL, CHRIS

Organization
TETRA TECH EM INCORPORATED
Organization
U.S. ENVIRONMENTAL PROTECTION AGENCY

U.S. ENVIRONMENTAL PROTECTION AGENCY

Bates: 000817

Date: 10/06/2000

Title: [GROUND WATER SAMPLING TRIP REPORT (RAC) FOR REMEDIAL, ENFORCEMENT OVERSIGHT, AND NONTIME CRITICAL REMOVAL ACTIVITIES FOR 09/26/2000 AND 09/27/2000]

Author: CZECHOWSKI, DOUGLAS A

Organization

TETRA TECH EM INCORPORATED

Addressee: VILLARREAL, CHRIS

Organization
U.S. ENVIRONMENTAL PROTECTION AGENCY

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU)
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 145557

Bates: 000847

To: 000923

Date: 02/14/2001

Pages: 77

Title: COMBINED QUALITY ASSURANCE PROJECT PLAN AND FIELD SAMPLING PLAN - REMEDIAL DESIGN / REMEDIAL ACTION OVERSIGHT FOR COUNTY ROAD 126 WEST AREA SURFACE WATER AND GROUND WATER SPLIT SAMPLING

Doc Type: WORK PLAN / AMENDMENT

Name

Organization

Author: GARCIA, MATT B

TETRA TECH EM INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 145559

Bates: 000924

To: 000969

Date: 03/30/2001

Pages: 46

Title: HEALTH AND SAFETY PLAN FOR PETRO-CHEMICAL SYSTEMS [TURTLE BAYOU] REMEDIAL DESIGN / REMEDIAL ACTION OVERSIGHT

Doc Type: WORK PLAN / AMENDMENT

Name

Organization

Author: GARCIA, LORI

TETRA TECH EM INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 145561

Bates: 000970

To: 001148

Date: 04/10/2001

Pages: 179

Title: [REMEDIAL DESIGN / REMEDIAL ACTION OVERSIGHT COMBINED QUALITY ASSURANCE PROJECT PLAN AND FIELD SAMPLING PLAN ADDENDUM FOR COUNTY ROAD 126 WEST AREA - SOIL GEOTECHNICAL CHARACTERIZATION]

Doc Type: WORK PLAN / AMENDMENT

Name

Organization

Author: GARCIA, MATT B

TETRA TECH EM INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

09/22/2006

ADMINISTRATIVE RECORD

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350
OUID: OU2
SSID: 81
Action: AMENDED RECORD OF DECISION

Docid: 906625
Bates: 001149
Date: 04/20/2001
Pages: 2

Title: [REQUEST FOR FORMAL REVIEW OF ENDANGERED SPECIES ISSUES REGARDING PROPOSED MAINTENANCE OPERATIONS AT PETRO-CHEMICAL SYSTEMS SUPERFUND SITE]

Doc Type: CORRESPONDENCE

	Name	Organization
Author:	VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY
Addressee:	MENDOZA, CARLOS	US FISH & WILDLIFE SERVICE

Docid: 144767
Bates: 001151
Date: 04/23/2001
Pages: 1

Title: [RESPONSE LETTER STATING THERE WILL BE NO ADVERSE EFFECT ON ANY ENDANGERED SPECIES]

Doc Type: CORRESPONDENCE

	Name	Organization
Author:	MENDOZA, CARLOS	US FISH & WILDLIFE SERVICE
Addressee:	VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 145563
Bates: 001152
Date: 04/23/2001
Pages: 21

Title: [COUNTY ROAD 126 WEST AREA SOIL GEOTECHNICAL CHARACTERIZATION (RAC) FOR REMEDIAL, ENFORCEMENT OVERSIGHT, AND NONTIME-CRITICAL REMOVAL ACTIVITIES FOR APRIL 11, 2001]

Doc Type: CORRESPONDENCE

	Name	Organization
Author:	GARCIA, MATT B	TETRA TECH EM INCORPORATED
Addressee:	VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 906666

Bates: 001173

To: 001178

Date: 05/01/2001

Pages: 6

Title: TECHNICAL MEMORANDUM FOR QUARTERLY GROUND WATER SAMPLING FOR PETRO-CHEMICAL SYSTEMS INCORPORATED (TURTLE BAYOU) SITE

Doc Type: MEMORANDUM

Name

Organization

Author: GARCIA, MATT B

TETRA TECH EM INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 905645

Bates: 001179

To: 001210

Date: 05/07/2001

Pages: 32

Title: [GROUNDWATER SAMPLING TRIP REPORT FOR PETRO-CHEMICAL BAYOU DISPOSAL AREA (RAC) FOR REMEDIAL ENFORCEMENT OVERSIGHT, AND NONTIME-CRITICAL REMOVAL ACTIVITIES FOR APRIL 24, 2001 AND 25, 2001]

Doc Type: SAMPLING / ANALYSIS

Name

Organization

Author: GARCIA, MATT B

TETRA TECH EM INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 912622

Bates: 001211

To: 001216

Date: 07/20/2001

Pages: 6

Title: TECHNICAL MEMORANDUM FOR QUARTERLY GROUND WATER SAMPLING FOR PETRO-CHEMICAL SYSTEMS FOR THE PETRO-CHEMICAL SYSTEMS INCORPORATED (TURLTE BAYOU) SITE

Doc Type: MEMORANDUM

Name

Organization

Author: GARCIA, MATT B

TETRA TECH EM INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

09/22/2006

Page 9 of 46

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 912624

Bates: 001217

To: 001252

Date: 08/10/2001

Pages: 36

Title: [GROUND WATER SAMPLING TRIP REPORT FOR (RAC) FOR REMEDIAL, ENFORCEMENT OVERSIGHT, AND NONTIME-CRITICAL REMOVAL ACTIVITIES ON JULY 31, 2001 AND AUGUST 1, 2001]

Doc Type: REPORT / STUDY

Name

Organization

Author: GARCIA, MATT B

TETRA TECH EM INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 196846

Bates: 001253

To: 002815

Date: 03/20/2002

Pages: 1563

Title: REMEDIAL DESIGN FOR PETRO-CHEMICAL SYSTEMS INCORPORATED (TURTLE BAYOU) SITE COUNTY ROAD 126 WEST AREA

Doc Type: REPORT / STUDY

Name

Organization

Author: GARCIA, MATT B

TETRA TECH EM INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 916856

Bates: 002816

To: 002845

Date: 08/09/2002

Pages: 30

Title: [GROUND WATER TECHNICAL MEMORANDUM, BAYOU DISPOSAL AREA RESPONSE ACTION CONTRACT (RAC) FOR REMEDIAL, ENFORCEMENT OVERSIGHT, AND NONTIME-CRITICAL REMOVAL ACTIVITIES]

Doc Type: MEMORANDUM

Name

Organization

Author: GARCIA, MATT B

TETRA TECH EM INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

09/22/2006

09/22/2006

ADMINISTRATIVE RECORD

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU)
CERCLIS: TXD980873350
OUID: OU2
SSID: 81
Action: AMENDED RECORD OF DECISION

Docid: 923329
Bates: 002846
To: 002909
Date: 11/01/2002
Pages: 64

Title: [ANALYTICAL RESULTS FOR MAIN WASTE AREA HOT SPOT SAMPLING DATA FOR THE PETRO-CHEMICAL SYSTEMS INCORPORATED SITE]

Doc Type: SAMPLING / ANALYSIS

<u>Name</u>	<u>Organization</u>
Author: SLOAN, R. L	LYONDELL CHEMICAL COMPANY
Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 923837
Bates: 002910
To: 003100
Date: 03/03/2003
Pages: 191

Title: REVISED SAMPLING AND ANALYSIS PLAN FOR REMEDIAL ACTION VERIFICATION FOR THE PETRO-CHEMICAL SYSTEMS INCORPORATED (TURTLE BAYOU) SITE

Doc Type: WORK PLAN / AMENDMENT

<u>Name</u>	<u>Organization</u>
Author: GARCIA, MATT B	TETRA TECH EM INCORPORATED
Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 177564
Bates: 003101
To: 003144
Date: 04/10/2003
Pages: 44

Title: [TECHNOLOGICAL LIMITS OF REMEDIATION AND MIGRATION ANALYSIS POWERPOINT PRESENTATION]

Doc Type: REPORT / STUDY

<u>Name</u>	<u>Organization</u>
Author: NONE,	APPLIED HYDROLOGY ASSOCIATES INC
Addressee: NONE,	NONE

ADMINISTRATIVE RECORD

Action: AMENDED RECORD OF DECISION

NONE

Addressee: VOSKOV, LUDA
TEXAS NATURAL RESOURCE CONSERVATION
COMMISSION

TETRA TECH EM INCORPORATED

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Name	Organization
-------------	---------------------

Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY
-------------------------------------	--------------------------------------

Docid: 163889

Bates: 003163

To: 003164

Date: 02/02/2004

Pages: 2

Title: [CORRESPONDENCE FOR A PERMANENT ON-SITE STORAGE FACILITY]

Doc Type: CORRESPONDENCE

Name	Organization
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Author: VOSKOV, LUDA	TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
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Name	Organization
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Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY
-------------------------------------	--------------------------------------

Docid: 163880

Bates: 003165

To: 003169

Date: 02/05/2004

Pages: 5

Title: [SOIL GAS EVALUATION FOR THE PETRO-CHEMICAL SYSTEMS INCORPORATED
SUPERFUND SITE]

Doc Type: WORK PLAN / AMENDMENT

Name	Organization
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Author: GARCIA, MATT B	TETRA TECH EM INCORPORATED
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Name	Organization
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Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY
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Docid: 163874

Bates: 003170

To: 003200

Date: 03/13/2004

Pages: 31

Title: [FIELD SAMPLING PLAN ADDENDUM-REVISION REMEDIAL ACTION FOR THE PETRO-
CHEMICAL SYSTEMS INCORPORATED (TURTLE BAYOU) SITE]

Doc Type: CORRESPONDENCE

WORK PLAN / AMENDMENT

ELECTRONIC RECORD

Name	Organization
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Author: GARCIA, MATT B	TETRA TECH EM INCORPORATED
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09/22/2006

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Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

<u>Name</u>	<u>Organization</u>
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Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY
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Docid: 163876

Bates: 003201

To: 003250

Date: 02/13/2004

Pages: 50

Title: [QUALITY ASSURANCE PROJECT PLAN ADDENDUM-REVISION REMEDIAL ACTION FOR THE PETRO-CHEMICAL SYSTEMS INCORPORATED (TURTLE BAYOU) SITE

Doc Type: WORK PLAN / AMENDMENT

<u>Name</u>	<u>Organization</u>
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Author: GARCIA, MATT B	TETRA TECH EM INCORPORATED
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<u>Name</u>	<u>Organization</u>
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Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY
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Docid: 163877

Bates: 003251

To: 003272

Date: 02/13/2004

Pages: 22

Title: [HEALTH AND SAFETY PLAN ADDENDUM-REVISION REMEDIAL ACTION AT COUNTY ROAD 126 WEST AREA, PETRO-CHEMICAL SYSTEMS INCORPORATED SITE]

Doc Type: REPORT / STUDY

<u>Name</u>	<u>Organization</u>
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Author: GARCIA, MATT B	TETRA TECH EM INCORPORATED
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<u>Name</u>	<u>Organization</u>
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Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY
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Docid: 167456

Bates: 003273

To: 003274

Date: 05/11/2004

Pages: 2

Title: [TRANSMITTAL OF THE AHA REPORT ON FATE AND TRANSPORT MODELING WITH SUMMARY FOR THE PETRO-CHEMICAL SYSTEMS INCORPORATED (TURTLE BAYOU) SITE]
Doc Type: CORRESPONDENCE
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
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Author: MILLER, HAROLD	A MILLER & COMPANY
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Administrative Record Collection Report

09/22/2006

ADMINISTRATIVE RECORD

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350
OUID: OU2
SSID: 81
Action: AMENDED RECORD OF DECISION

<u>Name</u>	<u>Organization</u>
Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 167457
Bates: 003275
To: 003303
Date: 05/11/2004
Pages: 29

Title: [TECHNICAL MEMORANDUM - FATE AND TRANSPORT OF CONSTITUENT-OF-CONCERN
AND RATIONALE FOR TECHNICAL INFEASIBILITY ZONES]
Doc Type: MEMORANDUM
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
Author: THOMSON, JIM	APPLIED HYDROLOGY ASSOCIATES INCORPORATED
Addressee: MILLER, J. C.	LYONDELL

Docid: 169052
Bates: 003304
To: 003313
Date: 06/15/2004
Pages: 10
Title: [TECHNICAL MEMORANDUM - FIELD SUMMARY REPORT FOR SAMPLES COLLECTED AT
THE TAYLOR PROPERTY - PETRO-CHEMICAL SYSTEMS INCORPORATED SITE]
Doc Type: MEMORANDUM
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
Author: GARCIA, MATT B	TETRA TECH EM INCORPORATED
Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 169053

Bates: 003314

To: 003317

Date: 06/15/2004

Pages: 4

Title: [TECHNICAL MEMORANDUM - FIELD SUMMARY REPORT FOR THE CHANDLER PROPERTY -
PETRO-CHEMICAL SYSTEMS INCORPORATED SITE]

Doc Type: MEMORANDUM
ELECTRONIC RECORD

Name

Organization

Author: GARCIA, MATT B

TETRA TECH EM INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 169054

Bates: 003318

To: 003327

Date: 06/15/2004

Pages: 10

Title: [TECHNICAL MEMORANDUM - FIELD SUMMARY REPORT FOR THE CARRELL PROPERTY -
PETRO-CHEMICAL SYSTEMS INCORPORATED SITE]

Doc Type: MEMORANDUM
ELECTRONIC RECORD

Name

Organization

Author: GARCIA, MATT

TETRA TECH EM INC.

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 169071

Bates: 003328

To: 003337

Date: 06/15/2004

Pages: 10

Title: [AR_TECHNICAL MEMORANDUM - FIELD SUMMARY REPORT FOR SAMPLES COLLECTED
AT THE TAYLOR PROPERTY - PETRO-CHEMICAL SYSTEMS INCORPORATED SITE]

Doc Type: MEMORANDUM
ELECTRONIC RECORD

Name

Organization

Author: GARCIA, MATT B

TETRA TECH EM INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

09/22/2006

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Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 177568
Bates: 003338
To: 003390

Date: 10/21/2004

Pages: 53

Title: [JUNE 2004 FIELD SUMMARY REPORT - REMEDIAL ACTION GROUND WATER SAMPLING AT BAYOU DISPOSAL AREA AND COUNTY ROAD 126 WEST AREA, PETRO-CHEMICAL SYSTEMS INCORPORATED SITE]

Doc Type: ELECTRONIC RECORD
REPORT / STUDY

<u>Name</u>	<u>Organization</u>
Author: WESTBERRY, KEITH	TETRA TECH EM INCORPORATED
<u>Name</u>	<u>Organization</u>
Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 947309
Bates: 003391
To: 003443

Date: 10/21/2004

Pages: 53

Title: [AR, JUNE 2004 FIELD SUMMARY REPORT - REMEDIAL ACTION GROUND WATER SAMPLING AT BAYOU DISPOSAL AREA AND COUNTY ROAD 126 WEST AREA, PETRO-CHEMICAL SYSTEMS INCORPORATED SITE]

Doc Type: REPORT / STUDY
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
Author: WESTBERRY, KEITH	TETRA TECH EM INCORPORATED
<u>Name</u>	<u>Organization</u>
Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 208852
Bates: 003443.001
To: 003443.012

Date: 11/04/2004

Pages: 12

Title: [APPLIED HYDROLOGY ASSOCIATES' DISCUSSION OF TURTLE BAYOU SUPERFUND SITE EPA AND TETRA TECH EM COMMENTS ON MONITORED NATURAL ATTENUATION PLAN]
Doc Type: CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
Author: CLODFELTER, CHRIS	APPLIED HYDROLOGY, INCORPORATED

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

<u>Name</u>	<u>Organization</u>
Addressee: MILLER, J. C.	LYONDELL

Docid: 178277

Bates: 003444

To: 003465

Date: 11/19/2004

Pages: 22

Title: [FIELD SAMPLING PLAN ADDENDUM 2 - REMEDIAL ACTION AT COUNTY ROAD 126 WEST AREA AND BAYOU DISPOSAL AREA- PETRO-CHEMICAL SYSTEMS INCORPORATED SITE]

Doc Type: SAMPLING / ANALYSIS
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
Author: WESTBERRY, KEITH	TETRA TECH EM INCORPORATED
Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 178279

Bates: 003466

To: 003503

Date: 11/19/2004

Pages: 38

Title: [QUALITY ASSURANCE PROJECT PLAN ADDENDUM 2 REMEDIAL ACTION AT COUNTRY ROAD 126 WEST AREA AND BAYOU DISPOSAL AREA - PETRO-CHEMICAL SYSTEMS INCORPORATED SITE]

Doc Type: ELECTRONIC RECORD
WORK PLAN / AMENDMENT

<u>Name</u>	<u>Organization</u>
Author: WESTBERRY, KEITH	TETRA TECH EM INCORPORATED
Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD****Site Name:** PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU**CERCLIS:** TXD980873350**OUID:** OU2**SSID:** 81**Action:** AMENDED RECORD OF DECISION**Docid:** 182187**Bates:** 003503.001**To:** 003503.010**Date:** 11/23/2004**Pages:** 10**Title:** [TETRA TECH EM, INCORPORATED COMMENTS ON THE TECHNICAL IMPRACTICABILITY EVALUATION]**Doc Type:** CORRESPONDENCE
ELECTRONIC RECORD**Name****Organization****Author:** WESTBERRY, KEITH

TETRA TECH EM INCORPORATED

Name**Organization****Addressee:** VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 182191**Bates:** 003503.011**To:** 003503.020**Date:** 11/23/2004**Pages:** 10**Title:** [COMMENTS ON THE LYONDELL TECHNICAL IMPACTIBILITY EVALUATION]**Doc Type:** CORRESPONDENCE**Name****Organization****Author:** WESTBERRY, KEITH

TETRA TECH EM INCORPORATED

Name**Organization****Addressee:** VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 181336**Bates:** 003504**To:** 003616**Date:** 12/10/2004**Pages:** 113**Title:** [FIELD SUMMARY REPORT REMEDIAL ACTION SAMPLING FOR OCTOBER 2004 AT COUNTY ROAD 126 WEST AREA]**Doc Type:** REPORT / STUDY**Name****Organization****Author:** WESTBERRY, KEITH

TETRA TECH EM INC.

Name**Organization****Addressee:** VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 191026

Bates: 003617

To: 003827

Date: 01/25/2005

Pages: 211

Title: SITE-SPECIFIC HEALTH AND SAFETY PLAN: TURTLE BAYOU COUNTY ROAD 126 AREA -
PETRO-CHEMICAL SYSTEMS INCORPORATED SITE

Doc Type: WORK PLAN / AMENDMENT
ELECTRONIC RECORD

Name

Organization

Author: NONE,

ENVIRONMENTAL RESOURCES MANAGEMENT

Name

Organization

Addressee: NONE,

NONE

Docid: 184521

Bates: 003827.001

To: 003827.003

Date: 01/26/2005

Pages: 3

Title: [EPA COMMENTS ON THE TECHNICAL IMPRACTICABILITY EVALUATION]

Doc Type: CORRESPONDENCE
ELECTRONIC RECORD

Name

Organization

Author: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Name

Organization

Addressee: MILLER, J. C.

LYONDELL

Docid: 183429

Bates: 003828

To: 004481.001

Date: 02/04/2005

Pages: 655

Title: [ADOPTION OF THE TETRA-TECH QUALITY ASSURANCE PROJECT PLAN AND FIELD
SAMPLING PLAN AND RELEVANT ADDENDUM - FAR WEST ROAD AREA SUPPLEMENTAL
INVESTIGATION - PETRO-CHEMICAL SYSTEMS INCORPORATED SITE]

Doc Type: ELECTRONIC RECORD
WORK PLAN / AMENDMENT

Name

Organization

Author: BOST, RICHARD C

ERM-SOUTHWEST INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

09/22/2006

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 183532

Bates: 004482

To: 004511

Date: 02/07/2005

Pages: 30

Title: [TURTLE BAYOU TECHNICAL INCAPABILITY EVALUATION STATUS FOR PETRO-CHEMICAL SYSTEMS INCORPORATED SITE]

Doc Type: ELECTRONIC RECORD
MEMORANDUM

Name

Organization

Author: CLODFELTER, CHRIS

APPLIED HYDROLOGY, INCORPORATED

Name

Organization

Addressee: MILLER, J. C.

LYONDELL

Docid: 191024

Bates: 004512

To: 005154

Date: 02/10/2005

Pages: 643

Title: [TRANSMITTAL WITH LABORATORY QUALITY ASSURANCE MANUALS AS ATTACHMENT 1 OF THE 02/04/2005 ADOPTION OF TETRA TECH QAPP AND FSP FOR THE SUPPLEMENTAL INVESTIGATION AT THE FAR WEST ROAD TURTLE BAYOU SITE]

Doc Type: WORK PLAN / AMENDMENT

Name

Organization

Author: BOST, RICHARD C

ERM-SOUTHWEST INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 185559

Bates: 005154.001

To: 005154.213

Date: 03/01/2005

Pages: 213

Title: [TECHNICAL IMPRACTICABILITY EVALUATION FOR LYONDELL CHEMICAL COMPANY TURTLE BAYOU SUPERFUND SITE]

Doc Type: REPORT / STUDY

Name

Organization

Author: NONE,

APPLIED HYDROLOGY INTERNATIONAL

Name

Organization

Addressee: NONE,

LYONDELL CHEMICAL COMPANY

09/22/2006

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Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 191028

Bates: 005154.214

To: 005154.214

Date: 03/03/2005

Pages: 1

Title: [TRANSMITTAL OF THE FIELD OVERSIGHT SUMMARY REPORT 2/01/2005 THROUGH 2/18/2005]

Doc Type: CORRESPONDENCE

Name**Organization**

Author: WESTBERRY, KEITH

TETRA TECH EM INC.

Name**Organization**

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 191651

Bates: 005155

To: 005161

Date: 03/03/2005

Pages: 7

Title: FIELD OVERSITE SUMMARY REPORT - 02/01/2005 THROUGH 02/18/2005

Doc Type: MEMORANDUM

Name**Organization**

Author: WESTBERRY, KEITH

TETRA TECH EM INC.

Name**Organization**

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 185467

Bates: 005162

To: 005167

Date: 03/24/2005

Pages: 6

Title: [ADDENDUM TO THE FEBRUARY 4, 2005 ADOPTION OF TETRA TECH QUALITY ASSURANCE PLAN AND FIELD SAMPLING PLAN FAR WEST ROAD AREA SUPPLEMENTAL INVESTIGATION - PETRO-CHEMICAL SYSTEMS INCORPORATED SITE]

Doc Type: WORK PLAN / AMENDMENT

Name**Organization**

Author: BOST, RICHARD C

ERM-SOUTHWEST INCORPORATED

Name**Organization**

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 194153

Bates: 005168

To: 005192

Date: 03/25/2005

Pages: 25

Title: [TRANSMITTAL WITH FIELD SAMPLING PLAN ADDENDUM 2 REMEDIAL ACTION AT COUNTY ROAD 126 WEST AREA, PETRO-CHEMICAL SYSTEMS INCORPORATED (TURTLE BAYOU) SITE]

Doc Type: WORK PLAN / AMENDMENT

Name

Organization

Author: WESTBERRY, KEITH

TETRA TECH EM INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 194156

Bates: 005193

To: 005229

Date: 03/25/2005

Pages: 37

Title: [QUALITY ASSURANCE PROJECT PLAN ADDENDUM 2 REMEDIAL ACTION AT COUNTY ROAD 126 WEST AREA, PETRO-CHEMICAL SYSTEMS INCORPORATED (TURTLE BAYOU) SITE]

Doc Type: WORK PLAN / AMENDMENT

Name

Organization

Author: WESTBERRY, KEITH

TETRA TECH EM INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 948798

Bates: 005230

To: 005253

Date: 03/25/2005

Pages: 24

Title: [FIELD SAMPLING PLAN ADDENDUM 2 REMEDIAL ACTION AT COUNTY ROAD 126 WEST AREA PETRO-CHEMICAL SYSTEMS INCORPORATED (TURTLE BAYOU) SITE]

Doc Type: WORK PLAN / AMENDMENT

Name

Organization

Author: WESTBERRY, KEITH

TETRA TECH EM INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 948799

Bates: 005254

To: 005289

Date: 03/25/2005

Pages: 36

Title: [QUALITY ASSURANCE PROJECT PLAN ADDENDUM 2 REMEDIAL ACTION AT COUNTY ROAD 126 WEST AREA, PETRO-CHEMICAL SYSTEMS INCORPORATED (TURTLE BAYOU) SITE]

Doc Type: WORK PLAN / AMENDMENT

Name**Organization**

Author: WESTBERRY, KEITH

TETRA TECH EM INCORPORATED

Name**Organization**

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 188998

Bates: 005290

To: 005420

Date: 05/04/2005

Pages: 131

Title: [FIELD SUMMARY REPORT FOR 02/01/2005 THROUGH 02/28/2005]

Doc Type: ELECTRONIC RECORD
REPORT / STUDY

Name**Organization**

Author: WESTBERRY, KEITH

TETRA TECH EM INCORPORATED

Name**Organization**

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 209991

Bates: 005420.001

To: 005420.009

Date: 05/20/2005

Pages: 9

Title: [REDACTED ADDENDUM NO. 3 TO FEBRUARY 4, 2005 ADOPTION OF TETRA TECH QUALITY ASSURANCE PROJECT PLAN AND FIELD SAMPLING PLAN FAR WEST ROAD AREA SUPPLEMENTAL SITE INVESTIGATION LIBERTY COUNTY, TEXAS, EL PASO ENERGY]
Doc Type: ELECTRONIC RECORD
WORK PLAN / AMENDMENT

Name**Organization**

Author: BOST, RICHARD L

ERM-SOUTHWEST INCORPORATED

Name**Organization**

09/22/2006

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

<u>Name</u>	<u>Organization</u>
Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 189164

Bates: 005421

To: 005422

Date: 06/03/2005

Pages: 2

Title: [SOIL CONCENTRATIONS USING PREVIOUSLY ESTABLISHED TIER 1 PCL SCREENING CRITERIA]

Doc Type: MEMORANDUM
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
Author: CLODFELTER, CHRIS	APPLIED HYDROLOGY, INCORPORATED

Addressee: MILLER, J. C.	LYONDELL
---------------------------------	----------

Docid: 189347

Bates: 005423

To: 005439

Date: 06/06/2005

Pages: 17

Title: [TRRP TIER 1 COMMERCIAL / INDUSTRIAL SOIL CRITERIA FROM THE SURFACE TO FOUR FEET BELOW GROUND SURFACE - PETRO-CHEMICAL SYSTEMS INCORPORATED (TURTLE BAYOU) SITE]

Doc Type: CORRESPONDENCE
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
Author: JAROS, ROB	REMEDIAL OPERATIONS GROUP INCORPORATED

Addressee: MILLER, JERRY	NONE
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Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 194137

Bates: 005440

To: 005563

Date: 06/24/2005

Pages: 124

Title: TRANSITIONAL MONITORED NATURAL ATTENUATION PLAN (REVISED JUNE 2005)

Doc Type: WORK PLAN / AMENDMENT

Name

Organization

Author: NONE, APPLIED HYDROLOGY ASSOCIATES,
INCORPORATED

Name

Organization

Addressee: NONE, LYONDELL CHEMICAL COMPANY

Docid: 191001

Bates: 005564

To: 005569

Date: 07/21/2005

Pages: 6

Title: [APRIL 2005 INVESTIGATION - SOIL SAMPLE RESULTS FOR THE FORMER WASTE
DISPOSAL PIT ADJACENT TO THE BAYOU DISPOSAL AREA]

Doc Type: ELECTRONIC RECORD
SAMPLING / ANALYSIS

Name

Organization

Author: WESTBERRY, KEITH TETRA TECH EM INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 191126

Bates: 005570

To: 005576

Date: 07/28/2005

Pages: 7

Title: [ANALYTICAL SUMMARIES FOR SOILS SAMPLES COLLECTED FROM THE RCRA VAULT AT
THE TURTLE BAYOU PROJECT]

Doc Type: E-MAIL MESSAGE

Name

Organization

Author: MILLER, JERRY C LYONDELL CHEMICAL COMPANY

Name

Organization

Addressee: VOSKOV, LUDA TEXAS NATURAL RESOURCE CONSERVATION
COMMISSION

09/22/2006

ADMINISTRATIVE RECORD

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350
OUID: OU2
SSID: 81
Action: AMENDED RECORD OF DECISION

Docid: 194149
Bates: 005577
Date: 07/29/2005
Pages: 275

Title: [FIELD SUMMARY REPORT FOR APRIL 2005 FIELD INVESTIGATION REMEDIAL ACTION SAMPLING AT COUNTY ROAD 126 WEST AREA (INCLUDES BAYOU DISPOSAL AREA SOIL AND RESIDENTIAL AND MONITORING WELL SAMPLING)]

Doc Type: ELECTRONIC RECORD
REPORT / STUDY

Name		Organization
Author:	WESTBERRY, KEITH	TETRA TECH EM INCORPORATED
<hr/> Name		Organization
Addressee:	VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 198483
Bates: 005852
Date: 07/29/2005
Pages: 1

To: 005852

Title: [TRANSMITTAL OF FIELD SUMMARY REPORT FOR APRIL 2005 FIELD INVESTIGATION REMEDIAL ACTION SAMPLING AT COUNTY ROAD 126 WEST AREA (INCLUDES BAYOU DISPOSAL AREA SOIL AND RESIDENTIAL AND MONITORING WELL SAMPLING)]

Doc Type: ELECTRONIC RECORD
REPORT / STUDY

Name		Organization
Author:	WESTBERRY, KEITH	TETRA TECH EM INCORPORATED
<hr/> Name		Organization
Addressee:	VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 208876
Bates: 005852.001
Date: 08/19/2005
Pages: 1

To: 005852.001

Title: [REQUEST FOR AN IMPORTANT CLARIFYING CHANGE CONCERNING CHARACTERIZATION OF FAR WEST ROAD AREA IN THE TETRA TECH EM INCORPORATED REPORT DATED JULY 29, 2005]

Doc Type: CORRESPONDENCE

Name		Organization
Author:	JOHNSON, BRIAN	EL PASO CORPORATION

09/22/2006

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

<u>Name</u>	<u>Organization</u>
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Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY
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Docid: 194151

Bates: 005853

To: 005853

Date: 08/31/2005

Pages: 1

Title: [TRANSMITTAL OF JUNE 2005 FIELD SUMMARY REPORT - RESULTS OF TETRA TECH
QUARTERLY GROUND WATER SAMPLING]

Doc Type: CORRESPONDENCE
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
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Author: WESTBERRY, KEITH	TETRA TECH EM INC.
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<u>Name</u>	<u>Organization</u>
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Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY
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Docid: 198512

Bates: 005854

To: 005974

Date: 08/31/2005

Pages: 121

Title: [FIELD SUMMARY REPORT FOR JUNE 2005 - RESULTS OF TETRA TECH QUARTERLY
GROUND WATER SAMPLING]

Doc Type: ELECTRONIC RECORD
REPORT / STUDY

<u>Name</u>	<u>Organization</u>
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Author: WESTBERRY, KEITH	TETRA TECH EM INCORPORATED
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<u>Name</u>	<u>Organization</u>
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Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY
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Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 194368

Bates: 005975

To: 005979

Date: 10/26/2005

Pages: 5

Title: [REVIEW OF DRAFT SUPPLEMENTAL SITE INVESTIGATION AND FOCUSED FEASIBILITY STUDY BY ERM FOR THE FAR WEST ROAD AREA PETRO-CHEMICAL SYSTEMS INCORPORATED SITE]

Doc Type: ELECTRONIC RECORD
REPORT / STUDY

Name

Organization

Author: WESTBERRY, KEITH

TETRA TECH EM INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 198828

Bates: 005980

To: 005981

Date: 11/10/2005

Pages: 2

Title: ORDER ON SCHEDULE FOR FINALIZING THE EL PASO DEFENDANT'S CONSENT DECREE [LYONDELL CHEMICAL COMPANY VS. ALBEMARLE CORPORATION CIVIL ACTION NO. 1:01-CV-890]

Doc Type: CONSENT DECREE (CD)

Name

Organization

Author: CRONE, MARCIA A
UNITED STATES DISTRICT COURT EASTERN DISTRICT

Name

Organization

Addressee: NONE,

NONE

Docid: 208795

Bates: 005981.001

To: 005981.132

Date: 12/01/2005

Pages: 132

Title: [LYONDELL CHEMICAL COMPANY TURTLE BAYOU PROJECT INSTITUTIONAL CONTROLS]
Doc Type: REPORT / STUDY
DEED / LEASE

Name

Organization

Author: NONE,

LYONDELL CHEMICAL COMPANY

Name

Organization

09/22/2006

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Name	Organization
Addressee: NONE,	NONE

Docid: 209931

Bates: 005982

To: 008738

Date: 12/02/2005

Pages: 2757

Title: [REDACTED SUPPLEMENTAL SITE INVESTIGATION AND ALTERNATIVE EVALUATION
REPORT COUNTY ROAD 126 WEST FAR WEST ROAD AREA LIBERTY COUNTY, TEXAS FOR
PETRO-CHEMICAL SYSTEMS INCORPORATED SUPERFUND SITE

Doc Type: REPORT / STUDY

Name	Organization
Author: BOST, RICHARD C	ERM-SOUTHWEST INCORPORATED
MANCHON, BRUCE F	ERM SOUTHWEST INCORPORATED
WHITLEY, DONALD L	ERM SOUTHWEST INCORPORATED

Addressee: NONE, **Organization** NONE

Docid: 195597

Bates: 008739

To: 008739

Date: 12/06/2005

Pages: 1

Title: [TRANSMITTAL OF REVISED FIELD SUMMARY REPORT FOR APRIL 2005 FIELD
INVESTIGATION]

Doc Type: ELECTRONIC RECORD
CORRESPONDENCE

Name	Organization
Author: BALLWEG, APRIL	TETRA TECH EM INCORPORATED
Name	Organization
Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 199187

Bates: 008740

To: 008881

Date: 12/06/2005

Pages: 142

Title: [REVISED FIELD SUMMARY REPORT FOR APRIL 2005 FIELD INVESTIGATION REMEDIAL ACTION SAMPLING AT COUNTY ROAD 126 WEST AREA, PETRO-CHEMICAL SYSTEMS INCORPORATED (TURTLE BAYOU)]

Doc Type: REPORT / STUDY
ELECTRONIC RECORD

Name

Organization

Author: BALLWEG, APRIL

TETRA TECH EM INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 208783

Bates: 008882

To: 008882

Date: 12/30/2005

Pages: 1

Title: [TRANSMITTAL OF THE SUPPLEMENTAL DATA REPORT FOR COUNTY ROAD 126 WEST - FAR WEST ROAD AREA, LIBERTY COUNTY, TEXAS]

Doc Type: CORRESPONDENCE

Name

Organization

Author: BOST, RICHARD C

ERM-SOUTHWEST INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS G

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 210017

Bates: 008883

To: 009225

Date: 12/30/2005

Pages: 343

Title: [REDACTED SUPPLEMENTAL DATA REPORT COUNTY ROAD 126 WEST FAR WEST ROAD AND BAYOU DISPOSAL AREAS LIBERTY COUNTY, TEXAS FOR THE PETRO-CHEMICAL SYSTEMS INCORPORATED SUPERFUND SITE]

Doc Type: WORK PLAN / AMENDMENT

Name

Organization

Author: BOST, RICHARD C
PERRY, ROBERT

ERM-SOUTHWEST INCORPORATED
ERM-SOUTHWEST INCORPORATED

Name

Organization

09/22/2006

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

<u>Name</u>	<u>Organization</u>
Addressee: NONE,	NONE

Docid: 196519

Bates: 009226

To: 009226

Date: 01/23/2006

Pages: 1

Title: [TRANSMITTAL OF THE DRAFT RECORD OF DECISION AMENDMENT FOR PETRO-CHEMICAL SYSTEMS, INC]

Doc Type: ELECTRONIC RECORD
CORRESPONDENCE
RECORD OF DECISION / AMENDMENT

<u>Name</u>	<u>Organization</u>
Author: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY
<u>Name</u>	<u>Organization</u>
Addressee: VOSKOV, LUDA	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Docid: 208782

Bates: 009227

To: 009231

Date: 01/25/2006

Pages: 5

Title: ADDENDUM NO. 5 TO FEBRUARY 4, 2005 ADOPTION OF TETRA TECH QUALITY ASSURANCE PROJECT PLAN AND FIELD SAMPLING PLAN FAR WEST ROAD AREA FULL-SCALE PILOT STUDY, LIBERTY COUNTY, TEXAS EL PASO ENERGY CORPORATION

Doc Type: CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
Author: BOST, RICHARD C	ERM-SOUTHWEST INCORPORATED
<u>Name</u>	<u>Organization</u>
Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 208780

Bates: 009232

To: 0009235

Date: 01/27/2006

Pages: 4

Title: ADDENDUM NO. 6 TO FEBRUARY 4, 2005 ADOPTION OF TETRA TECH QUALITY ASSURANCE PROJECT PLAN AND FIELD SAMPLING PLAN FAR WEST ROAD AREA SUPPLEMENTAL SITE INVESTIGATION LIBERTY COUNTY, TEXAS, EL PASO ENERGY CORPORATION

Doc Type: CORRESPONDENCE

Name

Organization

Author: BOST, RICHARD C

ERM-SOUTHWEST INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 198361

Bates: 009236

To: 009240

Date: 02/21/2006

Pages: 5

Title: [FEASIBILITY DEMONSTRATION OF MECHANICAL AUGER MIXING IN SITU CHEMICAL OXIDATION, INITIAL REPORT FOR THE PILOT TEST STUDIES CONDUCTED]

Doc Type: REPORT / STUDY
CORRESPONDENCE

Name

Organization

Author: BOST, RICHARD C

ERM-SOUTHWEST INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 213391

Bates: 009241

To: 009246

Date: 02/23/2006

Pages: 6

Title: [AR, TCEQ COMMENTS ON THEIR REVIEW OF THE DRAFT RECORD OF DECISION AMENDMENT, PETRO-CHEMICAL SYSTEMS INC. SUPERFUND SITE]

Doc Type: RECORD OF DECISION / AMENDMENT

Name

Organization

Author: TIPPLE, GREG

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Name

Organization

Addressee: VOSKOV, LUDA

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

09/22/2006

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 198356

Bates: 009247

To: 009249

Date: 02/28/2006

Pages: 3

Title: [COMMENTS ON THE FIRST DRAFT RECORD OF DECISION AMENDMENT]

Doc Type: CORRESPONDENCE

Name

Organization

Author: VOSKOV, LUDA

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 208880

Bates: 009250

To: 009257

Date: 02/28/2006

Pages: 8

Title: [TCEQ COMMENTS ON THE FIRST DRAFT RECORD OF DECISION AMENDMENT PETRO-CHEMICAL SYSTEMS INCORPORATED (TURTLE BAYOU) FEDERAL SUPERFUND SITE, LIBERTY COUNTY, LIBERTY, TEXAS]

Doc Type: CORRESPONDENCE

Name

Organization

Author: VOSKOV, LUDA

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 198383

Bates: 009258

To: 009263

Date: 03/01/2006

Pages: 6

Title: [SOIL CRITERIA ASSESSMENT FOR CR 126 WEST (FAR WEST ROAD AREA) PROJECT NO. 0043195]

Doc Type: REPORT / STUDY
CORRESPONDENCE

Name

Organization

Author: BOST, RICHARD C

ERM-SOUTHWEST INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

09/22/2006

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ADMINISTRATIVE RECORD

Action: AMENDED RECORD OF DECISION

Doc Type: WORK PLAN / AMENDMENT

Organization

ERM-SOUTHWEST INCORPORATED
ERM-SOUTHWEST INCORPORATED

Organization

NONE

Doc Type: WORK PLAN / AMENDMENT

Organization

ERM-SOUTHWEST INCORPORATED
ERM-SOUTHWEST INCORPORATED

Organization

NONE

Doc Type: REPORT / STUDY

Organization

ERM-SOUTHWEST INCORPORATED
ERM-SOUTHWEST INCORPORATED

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Name	Organization
Addressee: NONE,	NONE

Docid: 198423

Bates: 009554

To: 009555

Date: 03/03/2006

Pages: 2

Title: [LYONDELL CHEMICAL COMPANY'S RESPONSE TO TCEAQ COMMENTS ON THE DRAFT
RECORD OF DECISION AMENDMENT]

Doc Type: CORRESPONDENCE
ELECTRONIC RECORD

Name	Organization
Author: GUIER, DAVID	LYONDELL
Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 208758

Bates: 009556

To: 009569

Date: 03/06/2006

Pages: 14

Title: [REDACTED COMMENTS ON THE FIRST DRAFT RECORD OF DECISION AMENDMENT
REGARDING COUNTY ROAD 126 WEST AREA, PROPOSED FOR INCLUSION IN THE PETRO-
CHEMICAL SYSTEMS INCORPORATED SUPERFUND SITE]

Doc Type: REPORT / STUDY

Name	Organization
Author: BOST, RICHARD C	ERM-SOUTHWEST INCORPORATED
Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU)
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 199113

Bates: 009570

To: 009571

Date: 03/16/2006

Pages: 2

Title: CONSENT DECREE FOR PETRO CHEMICAL SYSTEMS, INC (TURTLE BAYOU) [LYONDELL
CHEMICAL COMPANY VS. ALBEMARLE CORPORATION CIVIL ACTION NO. 1:01-CV-890]

Doc Type: CONSENT DECREE (CD)

Name

Organization

Author: CRONE, MARCIA A

UNITED STATES DISTRICT COURT EASTERN
DISTRICT

Name

Organization

Addressee: NONE,

NONE

Docid: 199108

Bates: 009572

To: 009572

Date: 03/28/2006

Pages: 1

Title: [TIER 1 COMMERCIAL / INDUSTRIAL SOIL PCLS (TOTAL SOIL COMB) VALUES FOR
BENZENE, LEAD, ANPHTHALENE, AND VINYL CHLORIDE]

Doc Type: E-MAIL MESSAGE
ELECTRONIC RECORD

Name

Organization

Author: VOSKOV, LUDA

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 199110

Bates: 009573

To: 009573

Date: 03/31/2006

Pages: 1

Title: [REVIEW OF DIRECT CONTACT SOIL RISK EVALUATION EPA MEMORANDUM DATED
03/30/2006]

Doc Type: E-MAIL MESSAGE
ELECTRONIC RECORD

Name

Organization

Author: VOSKOV, LUDA

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

09/22/2006

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Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 199104

Bates: 009574

To: 009605

Date: 04/01/2006

Pages: 32

Title: AMENDED PROPOSED PLAN FOR PETRO-CHEMICAL SYSTEMS

Doc Type: ELECTRONIC RECORD
REPORT / STUDY

Name

Organization

Author: NONE,

U.S. ENVIRONMENTAL PROTECTION AGENCY

Name

Organization

Addressee: NONE,

NONE

Docid: 210193

Bates: 009606

To: 009607

Date: 04/03/2006

Pages: 2

Title: [TRANSMITTAL OF TCEQ SUGGESTED LANGUAGE FOR AMENDED RECORD OF DECISION
FOR THE PETRO CHEMICAL SYSTEMS INCORPORATED SITE]

Doc Type: CORRESPONDENCE
ELECTRONIC RECORD

Name

Organization

Author: VOSKOV, LUDA

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 210200

Bates: 009608

To: 009611

Date: 04/03/2006

Pages: 4

Title: [TCEQ SUGGESTED LANGUAGE FOR AMENDED RECORD OF DECISION FOR THE PETRO-
CHEMICAL SYSTEMS INCORPORATED SITE]

Doc Type: ELECTRONIC RECORD
MEMORANDUM

Name

Organization

Author: TIPPLE, GREG

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Name

Organization

Addressee: VOSKOV, LUDA

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

09/22/2006

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 199196

Bates: 009612

To: 009644

Date: 04/12/2006

Pages: 33

Title: REMEDIAL ADMINISTRATIVE RECORD INDEX FOR PETRO-CHEMICAL SYSTEMS

Doc Type: INDEX

Name

Organization

Author: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Name

Organization

Addressee: NONE,

NONE

Docid: 210341

Bates: 009645

To: 009647

Date: 04/12/2006

Pages: 3

Title: [PUBLIC NOTICES FOR PUBLIC REVIEW AND COMMENTS ON THE PROPOSED PLAN AND FOR PUBLIC MEETING FOR THE PROPOSED PLAN FOR THE PETRO-CHEMICAL SYSTEMS INCORPORATED SITE]

Doc Type: ELECTRONIC RECORD
NOTICE

Name

Organization

Author: NONE,

NONE

Name

Organization

Addressee: NONE,

NONE

Docid: 209501

Bates: 009648

To: 009688

Date: 04/12/2006

Pages: 41

Title: [REDACTED FIELD SAMPLING PLAN ADDENDUM NO. 3 REMEDIAL ACTION AT COUNTY ROAD 126 WEST AREA PETRO-CHEMICAL SYSTEMS, INCORPORATED (TURTLE BAYOU) SITE, LIBERTY, TEXAS]

Doc Type: WORK PLAN / AMENDMENT

Name

Organization

Author: BALLWEG, APRIL T

TETRA TECH EM INC.

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

09/22/2006

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 20878

Bates: 009689

To: 009691

Date: 04/25/2006

Pages: 3

Title: [TCEQ COMMENTS ON THE AMENDED PROPOSED PLAN FOR PETRO-CHEMICAL SYSTEMS, INCORPORATED (TURTLE BAYOU) FEDERAL SUPERFUND SITE, LIBERTY COUNTY, LIBERTY, TEXAS]

Doc Type: CORRESPONDENCE

Name

Organization

Author: VOSKOV, LUDA

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 208755

Bates: 009692

To: 009864

Date: 04/27/2006

Pages: 173

Title: [PETRO-CHEMICAL SYSTEMS INCORPORATED PUBLIC MEETING TRANSCRIPT FOR 04/27/2006 AT THE CALVARY BAPTIST CHURCH, LIBERTY, TEXAS]

Doc Type: PUBLIC MEETING TRANSCRIPT

Name

Organization

Author: NONE,

ESQUIRE DEPOSITION SERVICES

Name

Organization

Addressee: NONE,

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 208748

Bates: 009865

To: 009876

Date: 05/08/2006

Pages: 12

Title: [REDACTED STATUS OF SURFACE CONDITIONS AND POTENTIAL EXPOSURE ISSUES DURING AND FOLLOWING THE ISCO MECHANICAL AUGER MIXING PILOT TEST COUNTY ROAD 126 WEST (FAR WEST ROAD AREA), LIBERTY COUNTY, TEXAS, EPEC POLYMERS INCORPORATED]

Doc Type: REPORT / STUDY

Name

Organization

Author: BOST, RICHARD C

ERM-SOUTHWEST INCORPORATED

Name

Organization

09/22/2006

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Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Name**Organization**

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 208875

Bates: 009877

To: 009884

Date: 05/12/2006

Pages: 8

Title: [COMMENTS ON THE PROPOSED PLAN REGARDING COUNTY ROAD 126 WEST AREA AND BAYOU DISPOSAL AREA PETRO-CHEMICAL SYSTEMS, INCORPORATED (TURTLE BAYOU) SUPERFUND SITE, LIBERTY COUNTY, TEXAS]

Doc Type: CORRESPONDENCE

Name**Organization**

Author: TOWE, ROGER

EPEC POLYMERS, INC.

Name**Organization**

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 199107

Bates: 009885

To: 009893

Date: 05/31/2006

Pages: 9

Title: DIRECT CONTACT SOIL RISK EVALUATION FOR PETRO-CHEMICAL SYSTEMS

Doc Type: REPORT / STUDY

Name**Organization**

Author: VILLARREAL, CHRIS
KHOURY, GHASSAN

U.S. ENVIRONMENTAL PROTECTION AGENCY
U.S. ENVIRONMENTAL PROTECTION AGENCY

Name**Organization**

Addressee: NONE,

NONE

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 208874

Bates: 009894

To: 009898

Date: 06/23/2006

Pages: 5

Title: [PETRO-CHEMICAL SYSTEMS INCORPORATED (TURTLE BAYOU) FEDERAL SUPERFUND SITE COST EVALUATION OF SAMPLING EACH MECHANICALLY AUGERED TREATMENT BORING FOR IN SITU CHEMICAL OXIDATION EFFECTIVENESS, COUNTY ROAD 126 WEST, LIBERTY COUNTY, TEXAS]

Doc Type: CORRESPONDENCE

Name

Organization

Author: JOHNSON, BRIAN

EL PASO CORPORATION

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 208908

Bates: 009899

To: 010032

Date: 06/27/2006

Pages: 134

Title: [REDACTED FIELD SUMMARY REPORT APRIL 2006 FIELD INVESTIGATION REMEDIAL ACTION SAMPLING AT COUNTY ROAD 126 WEST AREA PETRO-CHEMICAL SYSTEMS, INCORPORATED (TURTLE BAYOU) SITE, LIBERTY, TEXAS]

Doc Type: ELECTRONIC RECORD
SAMPLING / ANALYSIS

Name

Organization

Author: BALLWEG, APRIL T

TETRA TECH EM INC.

Name

Organization

Addressee: VILLARREAL, CHRIS G

ENVIRONMENTAL PROTECTION AGENCY

Docid: 209495

Bates: 010033

To: 010333

Date: 07/18/2006

Pages: 301

Title: [REDACTED MECHANICAL AUGER MIXING (MAM) IN SITU CHEMICAL OXIDATION (ISCO) PILOT TEST REPORT, COUNTY ROAD 126 WEST (FAR WEST ROAD AREA), LIBERTY COUNTY, TEXAS, EPEC POLYMERS INCORPORATED]

Doc Type: REPORT / STUDY

Name

Organization

Author: BOST, RICHARD C

ERM-SOUTHWEST INCORPORATED

09/22/2006

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD****Site Name:** PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU**CERCLIS:** TXD980873350**OUID:** OU2**SSID:** 81**Action:** AMENDED RECORD OF DECISION

<u>Name</u>	<u>Organization</u>
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Addressee: VILLARREAL, CHRIS	U.S. ENVIRONMENTAL PROTECTION AGENCY
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Docid: 209918**Bates:** 010334**To:** 010749**Date:** 08/16/2006**Pages:** 416

Title: [REDACTED COMPILATION OF DOCUMENTS THAT DEMONSTRATE THE EFFECTIVENESS OF MECHANICALLY-AUGERED MIXING WITH IN SITU CHEMICAL OXIDATION UTILIZING PERSULFATE AS THE SELECTED TECHNOLOGY AND TREATMENT FOR THE COUNTY ROAD 126 WEST (FAR WEST ROAD AREA)]

Doc Type: WORK PLAN / AMENDMENT

<u>Name</u>	<u>Organization</u>
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Author: JOHNSON, BRIAN	EL PASO CORPORATION
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<u>Name</u>	<u>Organization</u>
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Addressee: VILLARREAL, CHRIS G	U.S. ENVIRONMENTAL PROTECTION AGENCY
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Docid: 210189**Bates:** 010750**To:** 011165**Date:** 08/16/2006**Pages:** 416

Title: [REDACTED REQUESTED PILOT TEST AND ISCO EFFECTIVENESS DOCUMENTATION PROVIDED TO EPA TO-DATE, COUNTY ROAD WEST (FAR WEST ROAD AREA), LIBERTY COUNTY, TEXAS, EPEC POLYMERS INCORPORATED]

Doc Type: WORK PLAN / AMENDMENT

<u>Name</u>	<u>Organization</u>
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Author: JOHNSON, BRIAN	EL PASO CORPORATION
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<u>Name</u>	<u>Organization</u>
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Addressee: VILLARREAL, CHRIS G	U.S. ENVIRONMENTAL PROTECTION AGENCY
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Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 208716

Bates: 011166

To: 011219

Date: 08/23/2006

Pages: 54

Title: [ANALYTICAL RESULTS FOR SAMPLE GROUP NO. 976928 - SAMPLES THAT ARRIVED AT THE LABORATORY ON FRIDAY, 02/03/2006]

Doc Type: SAMPLING / ANALYSIS
ELECTRONIC RECORD

Name

Organization

Author: NONE,

LANCASTER LABORATORIES INCORPORATED

Name

Organization

Addressee: NONE,

EL PASO ENERGY

Docid: 208745

Bates: 011220

To: 011310

Date: 09/06/2006

Pages: 91

Title: [UPDATED TABLES AND LANCASTER LABORATORY ANALYSIS REPORTS FROM THE SUPPLEMENTAL DATA REPORT, COUNTY ROAD 126 WEST, FAR WEST ROAD AND BAYOU DISPOSAL AREAS, LIBERTY COUNTY, TEXAS]

Doc Type: SAMPLING / ANALYSIS
CORRESPONDENCE

Name

Organization

Author: BOST, RICHARD C

ERM-SOUTHWEST INCORPORATED

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 209524

Bates: 011311

To: 011314

Date: 09/11/2006

Pages: 4

Title: [DRAFT VERSION OF THE TCEQ COMMENTS ON THE DRAFT AMENDMENT MODIFICATIONS FOR THE RECORD OF DECISION PETRO-CHEMICAL SYSTEMS INCORPORATED SITE]

Doc Type: E-MAIL MESSAGE

Name

Organization

Author: VOSKOV, LUDA

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Name

Organization

Addressee: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

09/22/2006

Administrative Record Collection Report**09/22/2006****ADMINISTRATIVE RECORD**

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU)
CERCLIS: TXD980873350

OUID: OU2

SSID: 81

Action: AMENDED RECORD OF DECISION

Docid: 209527

Bates: 011315

To: 011318

Date: 09/14/2006

Pages: 4

Title: [DISCUSSION OF TCEQS CONCERNS REGARDING ITEMS DESCRIBED IN THE PETRO-CHEMICAL SYSTEMS, INCORPORATED RECORD OF DECISION AMENDMENT AND A COPY OF THE ORDER GRANTING MOTION FOR ENLARGEMENT OF TIME AND MOTION TO EXPEDITE RESOLUTION OF MOTION FOR ENLARGEMENT]

Doc Type: RECORD OF DECISION / AMENDMENT

Name

Organization

Author: VILLARREAL, CHRIS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Name

Organization

Addressee: VOSKOV, LUDA

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Docid: 209525

Bates: 011319

To: 011319

Date: 10/03/2006

Pages: 1

Title: [NOTIFICATION OF TCEQS RECEIPT, REVIEW AND CONCURRENCE OF THE RECORD OF DECISION AMENDMENT PETRO-CHEMICAL SYSTEMS INCORPORATED SUPERFUND SITE DATED 09/22/2006]

Doc Type: CORRESPONDENCE

Name

Organization

Author: SHANKLE, GLENN

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Name

Organization

Addressee: COLEMAN, SAMUEL

U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 210047

Bates: 011320

To: 011544

Date: 09/22/2006

Pages: 225

Title: [REDACTED AMENDED RECORD OF DECISION FOR PETRO-CHEMICAL SYSTEMS INCORPORATED (TURTLE BAYOU) SUPERFUND SITE]

Doc Type: RECORD OF DECISION / AMENDMENT

Name

Organization

Author: NONE,

U.S. ENVIRONMENTAL PROTECTION AGENCY

Name

Organization

09/22/2006

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Administrative Record Collection Report

09/22/2006

ADMINISTRATIVE RECORD

Site Name: PETRO-CHEMICAL SYSTEMS INC (TURTLE BAYOU
CERCLIS: TXD980873350
OUID: OU2
SID: 81
Action: AMENDED RECORD OF DECISION

Name	Organization
Addressee: NONE,	NONE